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November, 1949

MAKE TANK-SETTING PAY THE BUCYRUS ERIE HYDROCRANE WAY

YOU can install oil and gas tanks quickly, profitably, with the fast, truck-mounted Bucyrus-Erie Hydrocrane. Here's what a few users say:

★ ★ ★

CUT TIME FROM 9 MAN-DAYS TO 4 HOURS

"We've installed a 2000-gal. oil tank, complete, in four hours with a Hydrocrane. This included loading, travel to job, unloading, digging the hole, loading excess dirt onto the truck, setting the tank and backfilling. The same kind of a job with a pick and shovel crew and chain hoist takes about nine man-days."

WINCHESTER BUILDING SUPPLY CO.
Winchester, Virginia

★ ★ ★

INSTALLED THREE TANKS IN A DAY

"By using a Hydrocrane, we've stepped up our oil tank installations to as many as three in a day, at widely separated locations around the city. The operator drives the Hydrocrane right up on the lawn and starts digging in a few minutes. When he's finished he picks up and leaves in the same short order. You can't beat the precision control of this hydraulic rig. It eases a tank down without a bit of jarring or bumping."

PETROLEUM EQUIPMENT, INC.
Milwaukee, Wisconsin

NO DAMAGE TO PAVEMENT

"On fuel oil tank installations, we run our truck-mounted Hydrocrane right up on the walk or driveway without fear of cracking the concrete. Often during excavation we have to drive on the lawn and this machine won't rip the turf like a crawler rig. We like its mobility. The Hydrocrane gets to a job, finishes it and is gone for what it costs to move a big rig. Our Model H-2 handles oil and gas tanks up to 5000-gal. capacity."

LOU BEAGLE, EXCAVATING,
Milford, Ohio

★ ★ ★

Two models — 1/4 yard, 2-ton and 3/8 yard, 3-ton. Available with clamshell bucket, magnet, snowbucket, catch basin bucket, 3-tine and multi-tine grapples and chain hook. Send the coupon for complete details.

BUCYRUS-ERIE HYDROCRANE DIVISION
SOUTH MILWAUKEE, WISCONSIN

FILL IN THIS COUPON FOR FULL INFORMATION

BUCYRUS-ERIE HYDROCRANE DIVISION
South Milwaukee, Wisconsin

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Company _____

Address _____

City _____ State _____

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Any Way You Figure It

(Slide rule, calculus, counting on your fingers)...

Bethlehem Wire Rope Means Low Cost per Unit of Work

Actually, it's as simple as 2 + 2 = 4. All you do is divide the purchase price of the rope by the total units of work it does in its life. The answer, of course, is cost per unit of work—the only *real* measure of wire rope economy.

What is a unit of work? It can be a ton of rock moved by a power shovel. Or a car of coal hauled up a slope. Or a ton-mile in oil-country rotary drilling. These are but three examples; there are many others. It isn't difficult to record, or closely estimate, the amount of work that a wire rope accounts for. That total will be high—and the unit cost *low*—when your choice is a Bethlehem rope.

It isn't first cost that determines whether a wire rope is expensive or economical. The rope labeled "Bargain" is frequently quite the reverse. You've found a bargain only when the rope cost is low with respect to the useful work accomplished.

On this basis—the only true yardstick—Bethlehem rope is a genuine "buy." Every foot, every inch of it, is built for service. . . built to give you *low* cost per unit of work. You can order it with confidence.

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BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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BOOM Down

ON PRODUCTION COSTS WITH . . .

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Primacord makes this possible through a combination of forces that work as a hard-hitting team. You plan trunk lines so that front row holes shoot a split-second before succeeding rows. You load down hole lines so that the Primacord contacts every cartridge. When you fire, every cartridge in the load explodes at full power.

A non-conductor of electricity, Primacord is insensitive to stray currents . . . hooks up with simple square knots and half hitches . . . is wound on light weight spools in three grades to meet every blasting condition. Ask your supplier which grade you should use; or write direct to The Ensign-Bickford Company, Simsbury, Connecticut. P-25

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Excavating Engineer

founded 1905

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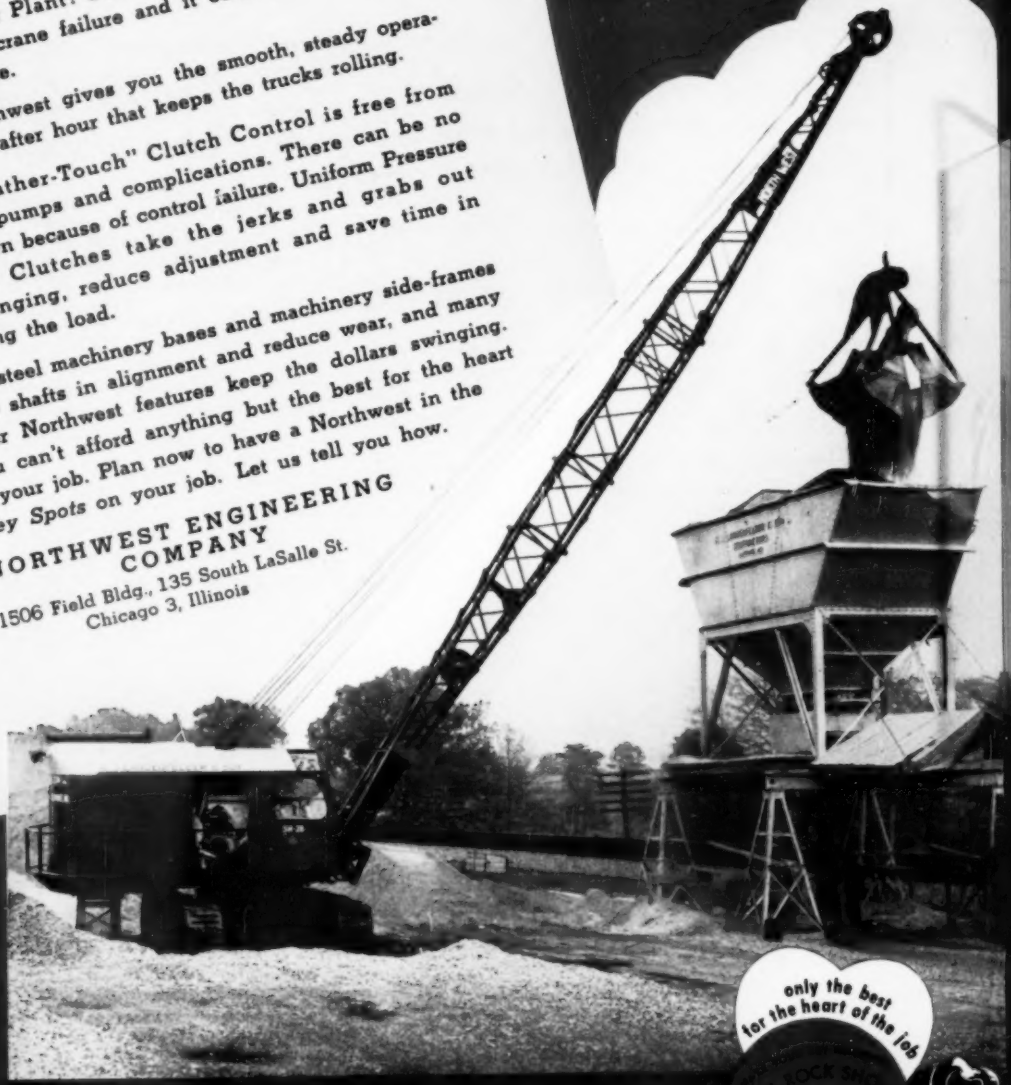

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Four New Motor Graders

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★ **BD-2** 17,772 lbs. . . . 50.5 brake hp. . . . GM 2-cycle diesel engine.

★ **Model D** 8,500 lbs. . . . 34.7 brake hp. . . . Allis-Chalmers gasoline engine. A completely new low-cost motor grader with *exclusive* tandem drive. Engineered new from the ground up to bring you BIG grader design and performance advantages.

Note -- The popular Model AD-3, introduced just prior to the war, set the pattern for all these models. Provides 78 brake hp. . . . weighs 21,835 lbs. . . . has GM 2-cycle diesel engine.

Two New Diesel-Powered Tractors

★ **HD-19** With *exclusive* torque converter drive! Load and speed automatically balanced—up to 25% more work on many applications. Weighs 40,000 lbs. 163 hp.—GM 2-cycle diesel engine.

★ **HD-5** Weighs 11,250 lbs. 40.26 drawbar hp. — GM 2-cycle diesel engine. Simple to service, easy to operate . . . more work capacity. A great tractor with a fully matched Allied line.

These two new units, along with the widely used HD-7 and HD-10 tractors, complete the Allis-Chalmers crawler line.

LOW-COST MODEL D

PERFORMERS

Brought to You By Allis-Chalmers Since the War

THIS TYPE BEEN INTRODUCED BY ONE IN SO SHORT A TIME - - - - - - -

Here's proof that Allis-Chalmers plans far ahead to keep you ahead on your work! For it takes years of planning...building and rebuilding . . . testing and retesting . . . on each completely new tractor or motor grader.

What's more . . . A-C listens to you . . . incorporates *your demands*, as well as the forward thinking and design ideas of its own organization and Allied equipment manufacturers. This complete cooperation is behind every new Allis-Chalmers tractor or motor grader.

Compare the six new machines — feature by feature with any others — and you'll see why they are truly Star Performers. ASK YOUR ALLIS-CHALMERS DEALER FOR A DEMONSTRATION . . . NOW.

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A New Star in the Ex

Another Output Leader in the Bucyrus-Erie Line — the Fast, Smooth, Powerful 51-B!

Diesel-Electric

Convertible 2-YARD SHOVEL, DRAGLINE, CRANE and CLAMSHELL

...cavating Field

51-B

HERE'S an entirely new 2-yard excavator — the Bucyrus-Erie 51-B! It features the sturdy yet lightweight construction, fast operating speed, simple "full-feel" controls and proven design that mean sustained high output with outstanding economy of operation. It's versatile, too . . . functions with top efficiency as shovel, dragline, crane or clamshell, and has been thoroughly proved in extensive field tests.

Among the 51-B's many important features are wide use of special alloy steels, selectively hardened for strength and long life, and anti-friction bearings to minimize power loss and insure concentricity of rotating parts. Clutches of generous size, requiring no adjustment for weather or temperature variations, provide smooth, fast action with high operator efficiency. Twin-rope crowd for shovel operation increases digging stability, speed and output while reducing shocks or vibrations and cutting maintenance costs. Independently operated power boom hoist with power controlled cushioned lowering is standard equipment for precision crane work. These and many other design features make the 51-B a worthy addition to the Bucyrus-Erie line, already world famous for dependable operation and tops for output. Your Bucyrus-Erie distributor has full details — see him today!

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

CLAMSHELL — 51-B carries booms 50' to 90'. Long caterpillars and solid foundation give superior stability for fast operation.

CRANE — Booms to 110' available, with jib extensions. Independent power boom hoist and precision controls speed crane work.

DRAGLINE — Standard or long mounting, 30" or 36" treads, tapered or flat ends to suit ground conditions.

See Your Bucyrus-Erie Distributor for Complete Information On This Outstanding New Excavator

1 plan helps prevent all 3

When you show the people in your company that you're interested in their welfare, they naturally react favorably. That's why *production goes up* when you boost your employee-participation in the Payroll Savings Plan. Here's how it happens:

The more U. S. Savings Bonds an employee holds, the more secure he feels. The more ure he feels, the greater his peace of mind the more contented, careful, and productive he is on the job.

Those facts aren't just something we dreamed up. They're borne out in the experience of more than 20,000 companies promoting the Plan.

Everybody Benefits!

Bond sales spread the national debt, thus increasing our national economic security. And, of course, what's good for the nation is good for you and your business!

The individual Bond buyer gets back $4, when his Bonds mature, for every $3 he invested. That's a boon for him, and —multiplied by millions of Bond holders —represents a huge backlog of purchasing power that will help assure national prosperity through the years ahead.

Five Steps Boost Participation

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Payroll Savings Plan's benefits to them.

4. Make a person-to person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

Nation-wide experience indicates that 50% of your employees can be persuaded to join —without high-pressure selling. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bonds Division. He is listed in your telephone directory. Wouldn't it be a good idea to call him right now, while it's on your mind?

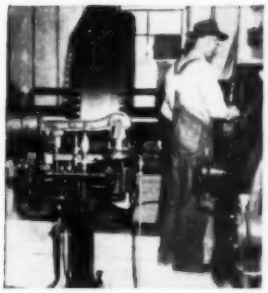
The Treasury Department acknowledges with appreciation the publication of this message by

EXCAVATING ENGINEER

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

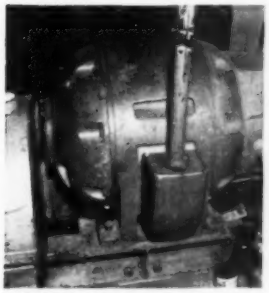
putting a MILLION cu. yds. of concrete in its place

... Electrically

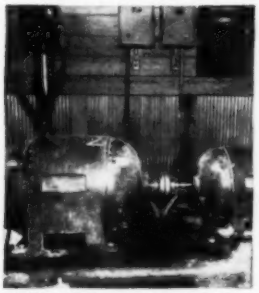


G-E 500-hp motor drives two 3000 cu. ft. Ingersoll Rand air compressors

Synchronous motor starter and control for air compressors



G-E motor-generator set operates frequency converters that run vibrators



200 hp G-E motor operates the hoisting mechanism of the American Revolver Crane

Contractors at Clark Hill Dam rely on G-E powered equipment to meet stiff work schedule

When you're working around the clock on a big construction job, there's no time for shutdowns. Your equipment has got to be reliable, easy-to-maintain, and safe. That's why Allstates Constructors, Inc., and the Corps of Engineers are making extensive use of *electrically driven* construction equipment—from vibrators to giant revolving cranes—for placing concrete at Clark Hill.

More and more machinery manufacturers and contractors are discovering the time- and money-saving advantages of dependable *electric drive.* And with G-E drive they get the added advantage of expert engineering assistance in application, installation, and service—wherever the job may be.

Ask him Today!

Whether you buy or build construction equipment, your G-E representative can show you how to do a better job—at lower cost—by complete electrification. Write him now, and he'll call on you at your convenience.

Electrified Construction
BETTER PRODUCT
LOWER COST

GENERAL ELECTRIC

664-5

HEY LOOK!
P&H'S NEW 955-A
WITH THE FAMOUS
MAGNETORQUE* SWING!
YEAH, FIRST TIME ON A 2½ YARD MACHINE
YES, AND IT HAS ALL THE FEATURES OF THE FAMOUS 1055
SWING POWER IS ELECTRO-MAGNETIC - NO FRICTION - - NO WEAR!
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*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

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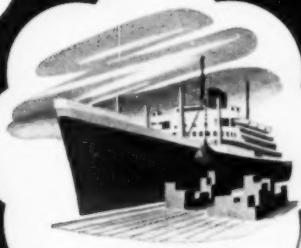


MARINE

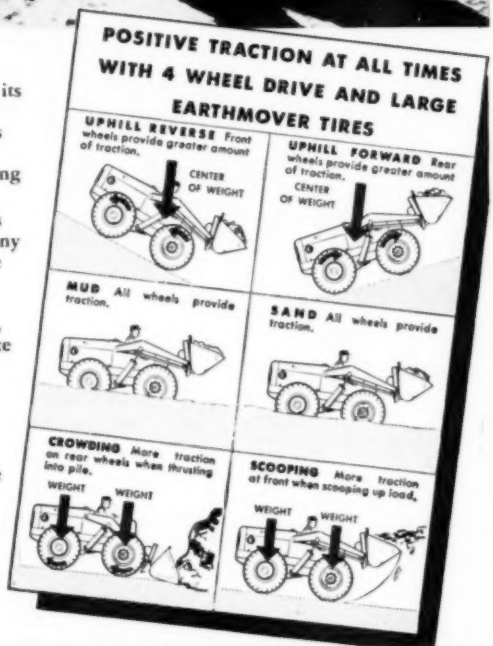
CONSTRUCTION

4 Wheel Drive PAYLOADER

The new Model HM Payloader has already proved its power, speed, traction and flotation on hundreds of projects for scores of owners . . . its ability to do jobs never before practical for wheeled tractor shovels . . . its digging power and loading, grading and stripping speed under poor ground conditions.

Four-wheel drive on large earthmover tires accounts for the HM's tremendous traction and flotation, but many other features contribute to its outstanding performance . . . power-boosted rear wheel steering, four speeds in each direction up to 24 mph, quick-acting, forward-reverse control, operator-controlled hydraulic dumping, powerful hydraulic brakes, easy operation and complete operator visibility.

The Model HM travels to the job fast on its own power over pavement or ground. It has 1½ cu. yd. bucket and 76 hp gasoline or diesel engine. "V" and Reversible Blade snow plows are available to make it a powerful snow fighter. Bulldozer Blade and Crane Hook attachments, also available, further increase its usefulness. Get full facts on this big, unique, multipurpose Tractor Shovel from your Hough Distributor or write The Frank G. Hough Co., 708 Sunnyside Avenue, Libertyville, Illinois.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EARTHMOVER TIRES
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UPHILL FORWARD Rear wheels provide greater amount of traction.
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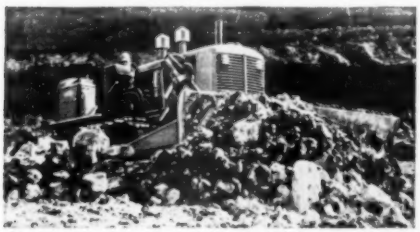
WEIGHT
WEIGHT
SCOOPING More traction at front when scooping up load.
WEIGHT
WEIGHT

WRITE for full information on any size of PAYLOADER, the 1½ yd. Model HM; the 1¼ yd. Model HL; the ¾ yd. Model HF; the 12 cu. ft. Model HA.

HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.

GM Diesel-powered Koehring 605 dragline with 1½ yd. bucket, loads shale in Euclid bottom dump. The GM Diesel-powered Euclids haul 17 yard loads up a 15% grade climbing out of the cut.



Allis-Chalmers HD-19 pulling a 12-ton "rooter" scrapes heavy shale off rock vein in final stage of stripping at National City, Michigan. A General Motors 6-71 Diesel powers the HD-19.

GM Diesel-powered Euclid loader, pulled by Allis-Chalmers HD-19 tractor, teams up with 7 GM Diesel-powered Euclid bottom dumps to move as much as 150,000 yards of earth a month.

100% GM DIESEL POWER—"100% PLEASED"

Says the Contractor

Stripping a 55-foot overburden of Michigan's hard clay, heavy soil and shale to bare gypsum deposits takes plenty of rugged, reliable power. That's why A. S. Leffler, contractor, standardizes on General Motors Diesels. Leffler operates 16 of them.

"We get more work done at about one-half the cost," says Mr. Leffler. "We went to the one make of engine 100% because of our previous satisfactory experience. Standardization on GM Diesels also helps keep our parts inventory low."

Remember all GM Series 71 Diesels have the same bore and stroke. Thus most wearing parts are interchangeable between engines of different sizes. Result: lower parts inventory, less time out for repairs, a big reduction in maintenance costs.

No wonder so many operators rely on these brawny 2-cycle Diesels to speed production and trim costs. You too, will find it pays to specify GM Series 71 Diesels. Get the facts from your local GM Diesel distributor.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... *Up to 200 H.P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS... *Up to 800 H.P.*

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

Excavation at "Turnabo

The Lost River diversion channel that flows two ways and into two rivers is being widened to improve irrigation and to dry up Tule Lake in California. George R. Stacy, Tulelake contractor, has put five draglines to work on the million-yd. excavation at the Oregon-California border.

IN the wide, fertile, 4,100-ft. high flatlands south of Klamath Falls, Ore., near the scene of the U. S. Army's most humiliating defeat in any Indian war, George R. Stacy of Tulelake, Calif., is efficiently and rapidly enlarging the 8 miles of the Lost River diversion channel to 2½ times its present size.

This is a million-yd. excavation in a key part of the Bureau of Reclamation's Klamath Proect. A Federal fight started in 1906 against Nature for more than 200,000 acres of potentially rich farmland—it has been a long battle in a paradoxical "backwards" country.

In 1873 dusty U. S. troopers galloped across these flatlands at the Oregon-California border. It was cow country then, in which a Modoc Indian, Captain Jack, had built a lava rock fort. His warriors fought from trenches, while the U. S. Army closed in in a howling circle. Those tactics were all backwards! And so was the battle—1,000 soldiers were defeated by 50 warriors.

Just as backwards are the antics of the river on which Stacy is working today. This silly Lost River has for centuries expended itself in trying to flood a desert. Even more ridiculous, it runs 106 miles from its source, meandering through the countryside, avoiding the nearby Klamath River into which it should logically drain, and finally wanders back to empty itself into shallow Tule Lake, *six miles from its source*. Tule Lake is a natural sump with no outlet and is some 50 feet lower in elevation than Klamath River.

The course of the Lost River has been changed by the diversion channel, but as this seems to be reverse procedure country, the Bureau's engineers took a tip from Captain Jack. Their channel works backwards. It serves to divert excess water from Lost River to the Klamath. But it also carries water back from the Klamath to the Lost whenever the water supply from the latter is too low for irrigation needs. Even its ends results sound paradoxical: (1) to irrigate the region surrounding Tule Lake; (2) to dry up most of

• 1. Dodge Powerwagon with 28-ft. homemade boom moves 6-in. LeRoi gas-powered pump along fills. Here men place pump intake in water. Surface material requires the addition of as much as 20% water which is fed by pumps from adjacent sumps and channels to handheld nozzles carried along the old banks.

• 2. Some concrete structures in old channel had to be removed. Stacy workman uses Worthington WJ-55 jackhammer supplied by 105-cfm Jay WK-80 gas-powered compressor.

• 3. Four of the men on job discuss progress along channel embankment. Left to right, they are Crawford; Jack C. Jorgensen, chief inspector for Bureau; George R. Stacy; and Felbert Rodgers, 22-B operator.

ut" Channel

by Tom Riley

• 1. Low sections along channel had to be built up and compacted—here Cat-drawn 8½-yd. LeTourneau scraper spreads 6-in. layer. Tires and tracks roll down previously placed material.

• 2. Hugh P. Crawford, field engineer-in-charge for Bureau of Reclamation, watches with satisfaction as water gushes into southbound irrigation ditch. Old diversion channel is just behind pump-house.

• 3. Before main excavation along channel is dug, it is dewatered by earth plugs placed by Bucyrus-Erie 22-B dragline. Bucyrus-Erie 38-B digs down to grade along opposite embankment.

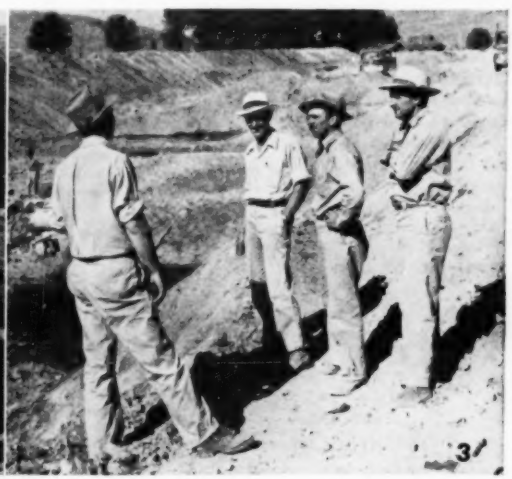
the lake itself and reclaim the rich bottomland.

Reclaim 76,000 Acres

Results of this "backwards" planning by early reclamation engineers and now being carried on by E. L. Stephens and C. O. Wamstad, project manager and chief of engineering of the Bureau's Klamath Project, are already apparent. Verdant farmlands in huge square blocks push back the sagebrush and lakes; 76,000 of the 96,000 acres of the area that was once Tule Lake have so far been reclaimed and irrigated.

The original diversion channel was constructed in 1910 with a capacity of 400 cfs and was enlarged to its present 1,200 cfs in 1930. The original Tule Lake gradually diminished in size, leaving the exposed lake bottom available for farm entry. A total of 624 farm units involving 43,558 irrigable acres have been opened to homestead entry since 1922 in the area once covered by Tule Lake. The first public land opening in the United States after World War II was the Tule Lake Division opening on Aug. 1, 1946. Demand for the reclaimed land was unprecedented—a lottery system had to be used to apportion the land so many were the applicants. Over 11,000 applications were received for the 216 farm units opened to entry on the Klamath Project in its three postwar openings.

Stacy's job will increase the channel from a 1,200- to 3,000-cfs capacity and will furnish flood protection in the reclamation of another 70,000 acres of



• Above and right: Two Bucyrus-Erie 22-B draglines and one 38-B dig down to grade from embankments about 150 feet apart, removing old banks and leaving center material—reach is too long for the smaller machines. Later on (right) 38-B backtracks, removes center strip and levels channel bottom.

• Below: New curved form headworks goes up at entrance of channel into Lost River. Old headgates (background) will be removed when new structure is finished.

• Right: 38-B walked 14½ miles to another Stacy job, Klamath Straits Drain, after diversion channel was started. It finished 93,000-yd. excavation in three weeks and walked back again.

Tule Lake land in the southern half of the project.

The Bureau's field engineer-in-charge, Hugh P. Crawford, finds nothing backward about the way the contractor is handling this diversion channel job. The contract was awarded to Stacy on a total bid of $537,292.10 last May 24. Deadline for completion is Nov. 5, 1950. Both crew and equipment moved in and were working during the last few days of May. Approximately 35 men are in the crew, half working on the excavation, half on secondary items. These include constructing laterals and drains, altering and replacing former canal structures and bridges and constructing new concrete headworks at the outlet from the diversion dam on Lost River.

The big part of the job—one million cu. yd. of channel excavation—was contracted at 14½ cents per yd. or $145,000. Because clearing and stripping was practically nonexistent in this sagebrush country, these items were included in this figure. As the excavation is all in dry, sandy soil with some hardpan but no rock, Stacy is doing the job with scrapers and draglines. His dragline superintendent, Al Nelson, is using two Bucyrus-Erie 22-B's, one Bucyrus-Erie 38-B, a Bucyrus-Erie 37-B and a ¾-yd. Lorain. The 38-B was purchased new for this job.

Draglines work from both sides, widening the old channel as they dig out the original banks. In most places the old channel is also being lowered two feet. Specifications call for a flat bottom, 60 feet wide and 16½ to 19 feet deep with 1½:1 side slopes after completion of the job.

The embankments from which the draglines work are approximately 150 feet apart—a too long reach for the smaller draglines with their 40- and

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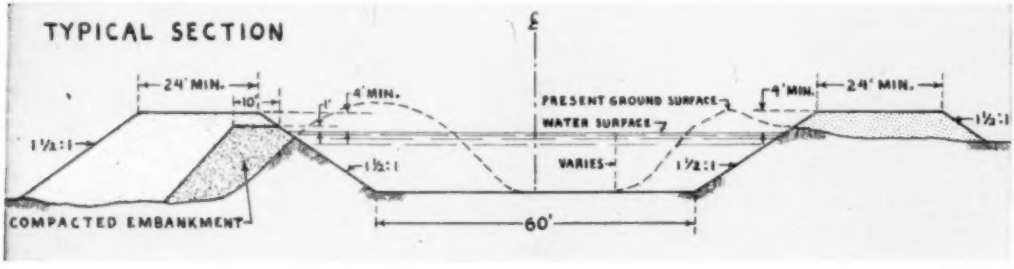
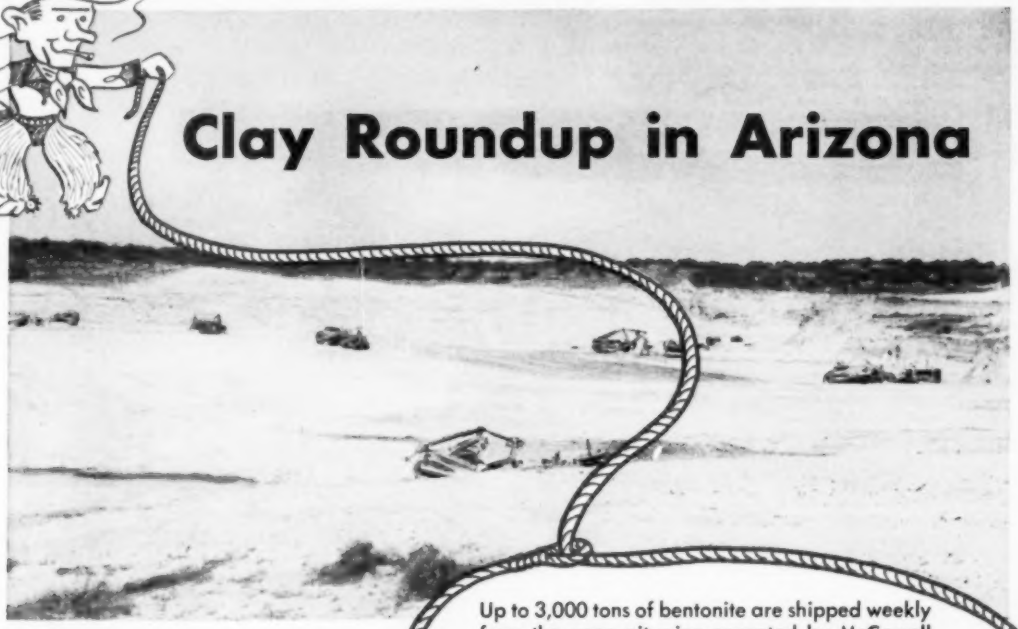
• Diagram shows typical section of new channel. Compacted embankment on left is placed by scrapers; if both banks are like one on right, no compaction is needed.



Clay Roundup in Arizona



Up to 3,000 tons of bentonite are shipped weekly from the open pit mine operated by McCarrell and Gurley near Sanders, Ariz. Nine tractor-scraper teams are stripping from 60 to 120 feet of sandy overburden while two shovels load out marketable clay from a 5-ft. strata.

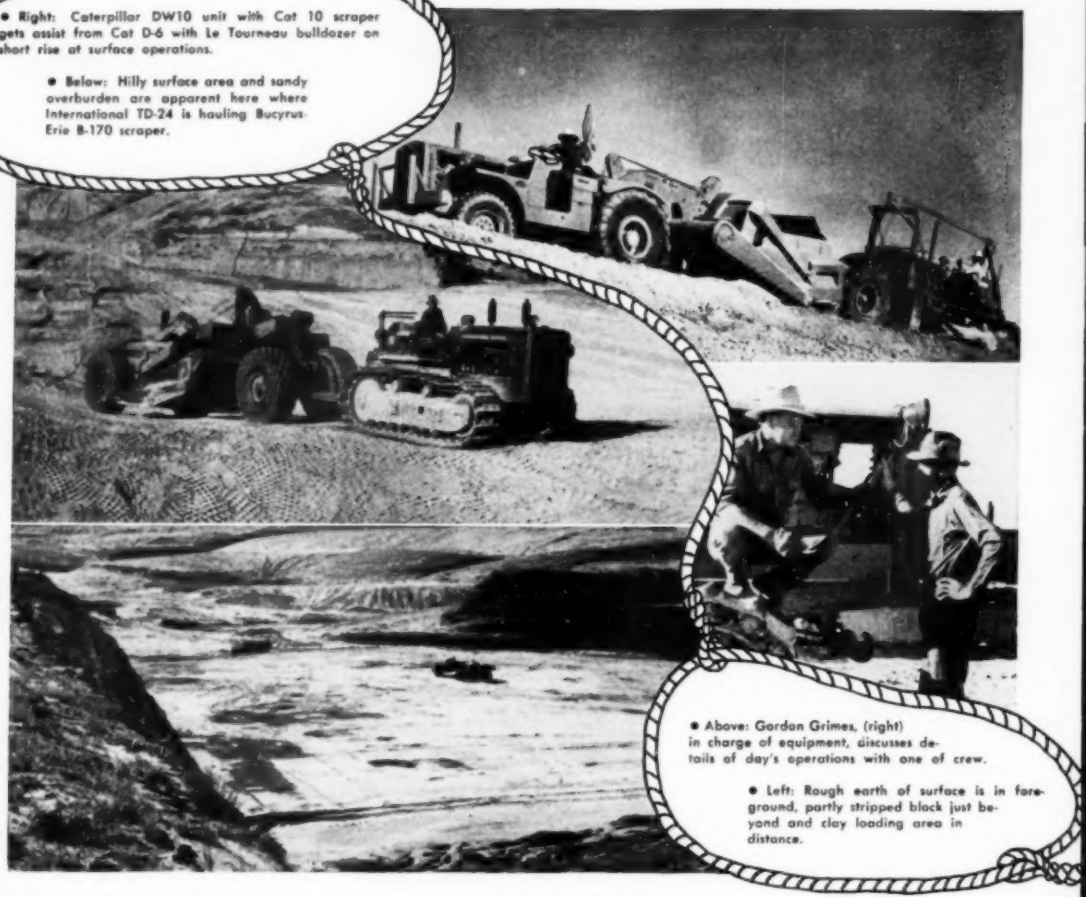
• Seven tractor-scraper teams can be seen stripping overburden from surface area of bentonite pit. Mine is worked in three areas on gradual rise—clay loading at one end, stripping immediately above clay in middle "block," and surface stripping at top.

by John L. Parker

• End of line for mine run bentonite is railcar on Santa Fe siding at Sanders. Here load of white clay starts to drop from 10-yd. Anthony dump body on Ford truck to gondola, ready for shipment to Los Angeles. Trucks are operated by owner drivers.

BENTONITE is one of the top examples of the way a scientific discovery can cause a minor product of the earth to spurt into unusual demand almost overnight. Until recently, this dull, white powdery collodial clay which does not swell in water was hardly considered even a minor product. But, today, because bentonite has been found to be a valuable catalyst in the manufacture of high test gasolines with octane ratings of 100 plus, its market is almost unlimited. In addition, experimental use has built up a wide variety of demands for the clay, ranging from filtering oils to a relief for gout.

In a semi-desert part of northern Arizona near the New Mexico border, C. A. McCarrell, Chambers, Ariz., and C. E. Gurley, Gallup, N. M., operating under the name C. A. McCarrell and Associates have opened one of the largest open pit bentonite mining operations in the country to supply the increasing demand. The area is owned by McCarrell and Associates and in part is under lease from the Santa Fe



• Right: Caterpillar DW10 unit with Cat 10 scraper gets assist from Cat D-6 with Le Tourneau bulldozer on short rise at surface operations.

• Below: Hilly surface area and sandy overburden are apparent here where International TD-24 is hauling Bucyrus-Erie B-170 scraper.

• Above: Gordon Grimes, (right) in charge of equipment, discusses details of day's operations with one of crew.

• Left: Rough earth of surface is in foreground, partly stripped block just beyond and clay loading area in distance.

Railroad. C. A. McCarrell is mine operator.

The McCarrell and Gurley mine, six miles from Sanders, Ariz., ranks as one of the top-quality activated or acid-treated bentonite clay deposits in the country. Early in the geological history of the world, an endless layer of fine ash wafted ceaselessly from the smouldering top of some ancient volcano. Year after year, winds carried the silky gray ash out over the quiet reaches of a mighty inland sea which covered what is now a dry basin 6,000 feet high and surrounded by low rolling hills.

Formation of Bentonite

As the volcanic ash gradually settled into the bottom of the sea along the shoreline, it was covered with silt, and the pressure of the water and soil transposed it into its present clay structure. Much of the silt overburden is still mixed with exceedingly fine raw volcanic ash, an abrasive material hard on crawler track bearings.

Viewed in profile, the deposit of bentonite is a thin white line from two to eight feet thick (averaging five feet), following the uneven bottom of the ancient sea in a line trending roughly from northwest to southeast. There seems to be no visible limit to the amount of usable clay available from the deposit which stretches over 20 square miles. However, from 60 to 120 feet of surface soil must be moved to reach the thin wavering layer of clay.

J. A. Mullen, who is now deceased, and McCarrell filed on the first claims close to the present pits in 1921, but the first bentonite mining operations were carried on about 10 miles west of the present workings by the Filtrol Corp. of California who purchased the claims from J. A. Mullen and Associates. Pioneer explorations and mining operations started in a small underground deposit. Wheelbarrows were loaded by hand and pushed to the surface.

In Feb., 1933, C. A. McCarrell started operations at the present location. With teams and Fresno scrapers he began open pit stripping and loading of clay to wagons for haul to the railroad.

Between four and five million cu. yd. of overburden have been moved since these open pit operations were initiated. The earthmoving operation involves a consistent and somewhat complicated pattern of overburden handling.

Stripping Set Up in Three "Blocks"

The depth of the surface soil in the present pit averages 65 feet.

Stripping operations to open the thin layer of bentonite are set up so that they are highly flexible. They are designed so that the greatest amount of clay will be ready to be opened up

on short notice to supply sudden peak demands.

In order to meet this requirement, stripping is a revolving and continuous earthmoving job. So that equipment will be able to move around easily in steady traffic flows, stripping is set up in three blocks which average about 10 acres in area apiece. The pit is worked from one end at clay level and rises gradually to the top of the overburden at the other end.

The middle area is brought down to within 15 to 20 feet of the bentonite loading operations which are in the lower area. The third area is blocked out at the top of the pit where stripping begins at surface level.

Open Pit on Moment's Notice

Sometimes equipment must move down from the upper block to the middle bench in order to strip down to usable material as quickly as possible. By this method the area of bentonite exposed to the surface is kept down as much as possible, but it is always possible to open up more of the clay at a moment's notice because of the layout of the pit.

Material stripped from both benches in each operation feeds a common spoils area. The stripping program has been laid out so that fill is returned to an area which has been mined out. This method of mining and filling, better known in underground operations, tends to level out the haul grades. It is practical because the overburden compacts easily. However, the varying depth of the deposit and the hilly land in the area slows down the haul and makes it difficult to work out an average grade or haul time.

Equipment used to strip overburden includes two Caterpillar D6 tractors, equipped with 4- and 7-yd. LeTourneau X and M scrapers respectively; one Cat D-7 with a 12½-yd. LeTourneau LP scraper; three Cat D8's, two hauling 13-yd. Caterpillar 80 scrapers and one a 13-yd. LeTourneau F; and two International TD-24 diesel tractors, one with a Bucyrus-Erie B-170 4-wheel scraper and the other with a LeTourneau W unit.

In addition, one 12-yd. Caterpillar DW10 with a Cat 10 scraper is being used experimentally. So far this unit has turned in a good performance and Gordon Grimes, who is in charge of equipment, is anxious to test it during the winter months when rain and snow conditions frequently prevail in that part of Arizona.

The units make an average 2,500-ft. round trip with very few hauls less than 2,000 feet. Raw volcanic ash scattered through the soil closely resembles tiny fragments of broken glass and usually ruins the track bearings on a crawler after 1,500 to 1,800 hours of use. Tire costs are negligible, however, and the DW10 tires have shown no appreciable wear after several months on the job.

Two Shovels Load Clay

The clay is usually loaded at the bottom of the long cut by either a ½-yd. Unit 357 or ½-yd. P&H 150 shovel. These units load four new Ford trucks with 10-yd. F. H. Anthony dump bodies. Trucks are operated by their owner-drivers under contract with the firm to haul from the mine to the Santa Fe rail siding at Sanders. Each truck makes the 12-mile round trip 12 or 14 times a day.

The day shift begins at 7 am and ends at 3:30 in the afternoon with 15 minutes allowed to pull the equipment into the nearby service yard, refueling on the turn into the yard. The afternoon shop gang have from 3:30 until 6 pm to lubricate and to get the earth-

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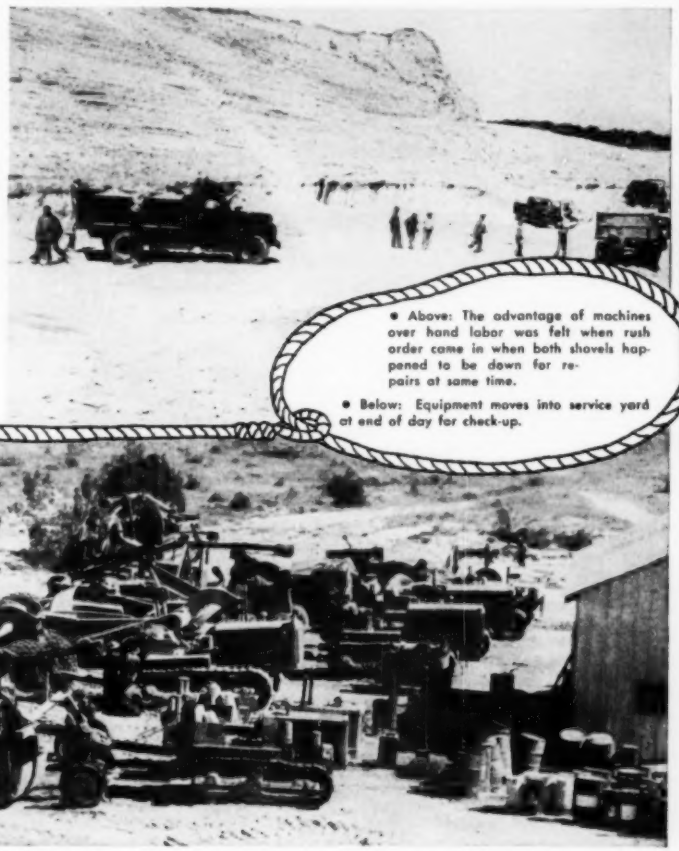


• Above: The advantage of machines over hand labor was felt when rush order came in when both shovels happened to be down for repairs at same time.

• Below: Equipment moves into service yard at end of day for check-up.

UNDERGROUND QUARRY

By practicing underground the bench method of open pit mining and the drill-blast-load-haul techniques of stone quarries, the U. S. Bureau of Mines has succeeded in cutting the cost of taking oil shale out of the earth to 32.9 cents a ton. The Bureau's experimental mine and demonstration plant near Rifle, Colo., is tapping the 30-gallon-a-ton layer known as Mahogany Ledge, richest vein in a 500-ft. deposit.

• Top: No matter where you stand, it's a 1,000-ft. plus drop from those hairpin curves. Spoil — 73,000 yd. were excavated to provide 1-acre yard room shown — was dumped west of ridge (center).

• Left: Portable scaler and blaster's platform work along top bench inside mine. Service lines are carried along 27-ft. ceiling. (Bureau of Mines photos)

THREE thousand feet above the valley floor, at the top of a tortuous, zigzag trail which creeps up along the edges of nearly vertical cliffs lies the entrance into "Underground Quarry" — the experimental oil shale mine near Rifle, Colo. The twisting, 5½-mile road leads down to the U. S. Bureau of Mines demonstration plant on Naval Oil Shale Reserves No. 1 where retorts began producing crude shale oil in May, 1947.

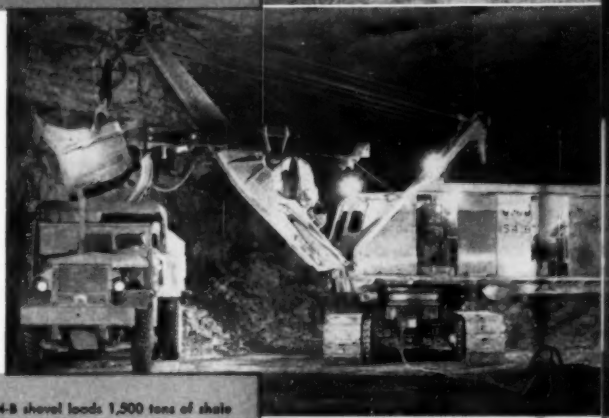
Every 8-hour shift 15-ton diesel trucks, fueled with diesel oil produced by a new 200-barrel-a-day refinery at the demonstration plant, haul 1,500 tons of rock to stockpiles ⅓ of a mile from the 3-yd. electric shovel inside Mahogany Ledge. This richest of veins in the nation's most valuable oil shale deposit is being developed in a cliffside with 400- and 500-ft. escarpments, all practically straight up and down. Mahogany Ledge is a 70-ft. strata of average 30-gallon-a-ton oil shale at the foot of a 500-ft. thick deposit. It is part of the Green River formation which covers 16,500 square miles in Colorado, Utah and Wyoming. The principal deposit lies in 1,000-square mile Piceance Creek basin northwest of Rifle where the potential oil yield is estimated at 100 billion barrels—45 years' supply in the United States at today's rate of consumption.

Because Mahogany Ledge, with its 30-gallon-a-ton shale, could probably be developed most economically, the U. S. Bureau of Mines selected it for its demonstration plant after Congress passed the Synthetic Liquid Fuels Act in 1944. The Act set up funds for research which would develop new sources of oil—from coal, oil shale, agricultural and forestry products. The present increasing demand for the earth's "black gold"—set at from 4.7 to 6 billion barrels annually by 1975—followed the heavy draw on producing petroleum fields during World War II. Known natural supplies have an approximate 12½-year production life. The U. S. Bureau of Mines is out to extract oil from the Ledge at the least possible cost to pave the way for a commercially profitable enterprise in this and other deposits.

What Oil Shale Is

Actually, "oil shale" is a misnomer. It's neither shale nor does it contain oil as such. Instead it's a tough, magnesium marlstone, a fine-grained sedimentary rock with a structure more like slate than anything else. Sixteen

• Four men can drill 72-hole round of 15-ft. holes in six hours with special multiple-drill carriage.



• Bucyrus-Erie 54-B shovel loads 1,500 tons of shale daily to three 15-ton Euclid dump trucks like this one.

• NTU retort at demonstration plant dumps 35 tons of spent shale at end of run. (Bureau photos)

cubic feet weigh one ton. It contains a solid, carbonaceous material known as kerogen which can be broken down and volatilized by moderate heat—the condensate is crude shale oil which looks like petroleum.

Soon after the site for the mine was selected, a pioneer road began climbing the steep inclines from the plant location. It reached the entrance to the mine adits in Sept., 1945. By the Spring of '47, it had been graded, stabilized and finished. Grades were generally below 10% with a maximum of 14% on short rises; the sharpest curves have a radius of 40 feet.

The first half mile of the road from the plant was built through rough coun-

• Left Above: A room in selective mine which is separate from one in which mining procedures are being evaluated. Selective workings are kept to mine various grades of shale for retorting and refining tests.

• Left: Close-up of mine yard shows entrance to selective mine at far right and two openings into underground quarry at far left.

• Below: Photo shows sharply-defined escarpments up which mine road climbs from camp area and demonstration plant. The 3½-mile road reaches top of ridge in long sweep, follows edge for a distance and then, in five switchbacks, finally scales the cliffside and reaches mine entrances. (Bureau photos)

try to the bottom of a long ridge or "hogback" that extends from below the line of cliffs out into the valley. The road reaches the outermost point of the ridge in a long sweep; it then follows the top of the ridge for a distance and gains the final elevation in five switchbacks west of the ridge.

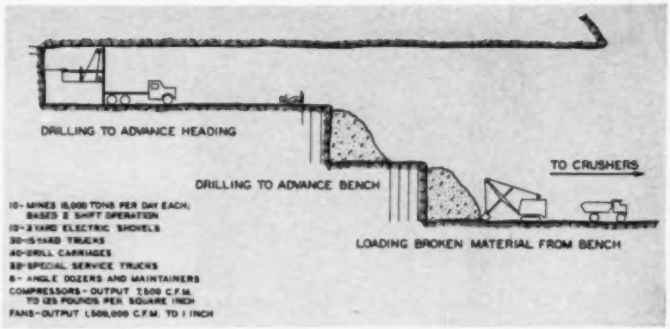
Move 73,000 Yd. at Mine Site

Opening up a work area outside the adits was an excavation job of no mean caliber—no flat area whatever existed at the mine site. Nearly 73,000 yd. of material — 17,000 of solid rock — were moved to provide one acre of yard room. Because of the switchbacks of the mine road below, little spoil could be dumped west of the ridge. Unlimited dump room was available just east of the ridge—and there the spoil rolled down the mountainside 1,500 feet before coming to rest. The surface excavations were completed in Fall, 1946.

A recent test run at Underground Quarry produced 29,835 tons at a direct cost of 32.9 cents per ton. Average production was 111 tons for underground labor and 92.7 tons for all labor, including direct supervision, engineering and maintenance. However, this latest production record comes after five years of try-and-try-again to get out the oil shale for less and less.

Choice of Mining Method

Naturally, the first problem was the right mining method. Open-cut mines and quarries produce at a much lower cost per ton of rock broken and hauled away than do underground mines. However, the flat, horizontal, stratified Mahogany Ledge lends itself to low underground mining costs.


DRILLING TO ADVANCE HEADING
DRILLING TO ADVANCE BENCH
TO CRUSHERS
LOADING BROKEN MATERIAL FROM BENCH
10- MINES (5,000 TONS PER DAY EACH; BASED ON 2 SHIFT OPERATION
12- 2 YARD ELECTRIC SHOVELS
30- 6 YARD TRUCKS
40- DRILL CARRIAGES
32- SPECIAL SERVICE TRUCKS
6- ANGLE DOZERS AND MAINTAINERS
COMPRESSORS - OUTPUT 7,500 C.F.M. TO 125 POUNDS PER SQUARE INCH
FANS - OUTPUT (300,000 C.F.M. TO 1 INCH

• Longitudinal section, Bureau of Mines sketch, shows bench method being employed in experimental mine. List at left shows equipment requirements of commercial mine. Such a plant will probably have to produce 10,000 barrels of shale oil daily to be economically practical.

The idea of open cut mining the deposit was abandoned because Mahogany Ledge is the lower 70 feet of the 500-ft. oil shale deposit. Open-cut mining would have required moving all the rock in the deposit regardless of value—it averages 15 gallons a ton. Haulage costs would have increased, too, because the most convenient place for the retorting plant was at the valley floor at the base of the cliffs. As it is, the present stopes are 3,000 feet vertically from the plant, 9,000 feet horizontally.

However, because open cut and quarry methods cost less than underground practices, the end result could be called a compromise—the Bureau of Mines decided after studying the behavior of the roof stone, to take a quarry underground and apply as many open cut and surface mining practices as possible.

Open Room in '20's

A room-and-pillar method was selected for mining the Ledge. Back in the roaring '20's before the rich east Texas oil fields were discovered, the Bureau of Mines had operated an experimental plant at Cottonwood Point near Rifle. A room 59 feet in diameter within the same 70-ft. interval had been opened. In the years that elapsed, these workings showed no evidence of failure except that a 6-in. layer had started to peel at the room neck. No failure of roof stone was noted. Geophones were installed in a new test room, 50x100x9, in the present workings to record stress noises—none were heard.

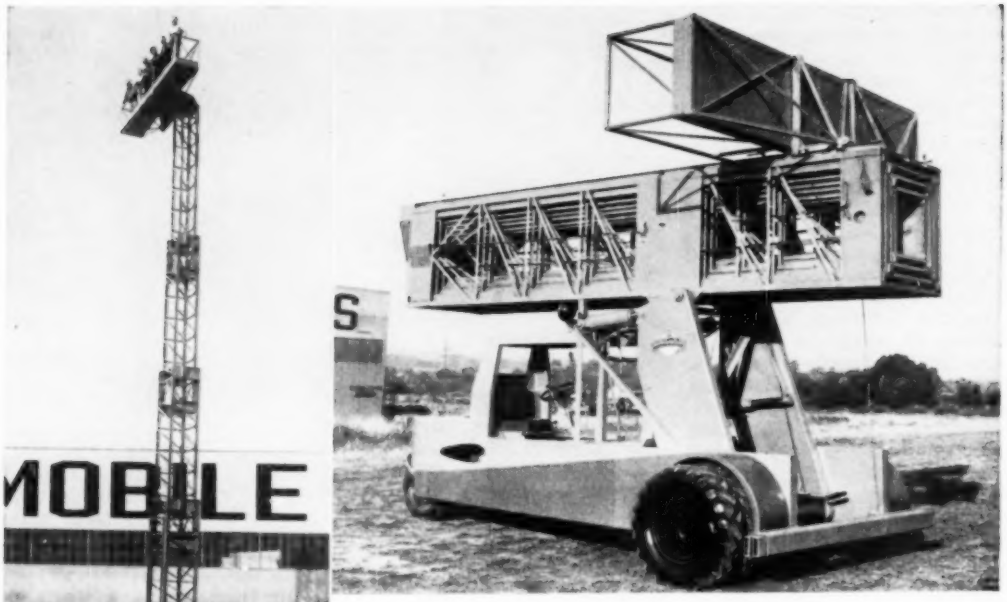
The test room was then increased to 60 feet, then to 70 and 80 feet. No undue strain was noticed and the 60-ft. room with 60-ft. pillars was the decision for the present mine.

Work On Three Benches

Mahogany Ledge is worked on three levels with an advance heading at the top which allows blast holes to be drilled parallel to the roof. The two lower benches are similar to benches in an open cut mine and quarry practices are followed for breaking, loading and transporting the shale. The lower bench is not being worked at present because all data collected on the middle bench will apply to the bottom one.

Before drilling and blasting proce-

• Left to right are NTU retorts, crushed shale storage bins and crusher buildings at demonstration plant. Mine is 9,000 feet horizontally and 3,000 feet vertically from this plant. (Bureau photo)



• Left and Above: This Wagnermobile lift truck was recently shipped to mine, built on special order from government. Scaffold-bearing hoist folds to 12 ft. 8 in. over cab — entire unit is 20 feet high while nested but telescopes to 62 feet. Truck is powered by 92-hp Hercules diesel engine, is hydraulically operated with exception of cables which lift and lower hoist. Scaffold is 3x12 ft. and was designed for use by two men.

dures could be worked out, the rate at which oil shale could be moved out of the mine had to be determined. A 3-yd. electric shovel—a type almost universally used in open pit work—was chosen because it was, at the same time, the largest and the most economical machine to work in a 60-ft. room 25 feet high. A 3-yd. shovel could move between 1,200 and 1,500 tons of rock per shift. Ward-Leonard control was thought necessary because the digging was going to be tough.

William E. Hayes

Funeral services were held August 5 in Detroit, Michigan, for William E. Hayes, 68, excavating contractor who prepared sites for some of Detroit's largest buildings and factories. He died July 30 in Henry Ford hospital. Burial was in Roseland Park cemetery.

Mr. Hayes' firm put down foundations for the General Motors building, the United States Rubber Company plant, and for portions of the Ford Motor Company and Hudson Motor Car Company factories.

A brother, James F., survives him.

A 2½-yd. Bucyrus-Erie 54-B shovel was brought in to load the 15-ton Euclid diesel trucks. Its front end had been cut down so it could work in the 25-ft. headroom provided in the "rooms." With the shortened boom, the Bureau of Mines was also able to equip the machine with a 3-yd. dipper.

The 25-ft. headroom originally chosen for the shovel was a compromise. To make all three levels equal, each bench should have been 23⅓ feet high. However, the efficiency of the shovel would have been cut down considerably working in that space. Twenty-seven feet was the most desirable height from the shovel loading standpoint; hence, the 25-ft. compromise.

Right now, the shovel is working in a 27-ft. room through no planning by the Bureau of Mines. A distinct parting on a bedding plane occurs between the roof stone and the Mahogany Ledge. Another parting occurs 27 feet below the roof stone. Soon after operations began, the bottom of the top heading broke down to the second parting, giving the shovel two extra feet, the height originally thought best for the machine.

Three methods of haulage were considered: rail, belt conveyor and truck. Before the shale could have been transported by a conveyor, it would have required crushing inside the mine. Rail haulage did not fill the bill either because it does not lend itself to the room-and-pillar method of mining—stub tracks are necessary to get cars to the face. Only one of two cars could have been loaded without switching, cutting down the working time of the shovel. Consequently, truck haulage was the only "out"—two 15-ton end-dump Euc's were obtained from the Navy and a third was purchased. Their capacity seems to be in accord with that of the shovel although larger trucks are being considered.

Oil shale is hauled over the road from the stockpiles to the plant in 6-yd. gasoline trucks which can make six trips every eight hours over the steep 5½-mile route. They haul seven tons a load.

Once the basis of 1,500 tons was set for the loading procedure, the Bureau of Mines began to work out blasting methods. Thousands of feet of drilling with Gardner-Denver CF79 column-mounted, 3-in. continuous-feed drifter drills showed that a 2⅛-in. hole could be drilled with Timken H-type detachable crossbits at an average rate of 19

inches per minute while the air pressure, measured at the drill, averaged 84 psi.

However, the bits drilled only about five feet before dulling. In that distance the cutting edges lost little of their original sharpness but the reaming edges were round with an excessive loss of gauge—.094 inches. More than ⅛ of the original gauge had to be removed before resharpening the bit.

In October, 1945, hardsurfacing the bits was tried. The material used was acetylene tube borium and comprises steel tubes containing accurately sized particles of cast tungsten carbide. Because the standard bits wore to the greatest extent on the reaming points, the bits were prepared so that the deepest layers of hardsurfacing were placed on those points.

The bit was prepared for hardsurfacing by grinding the cutting edge flat to a distance 1/16 inch from the original edge toward the seat of the bit. Reaming points were ground at an angle of 45° to the cutting edges to

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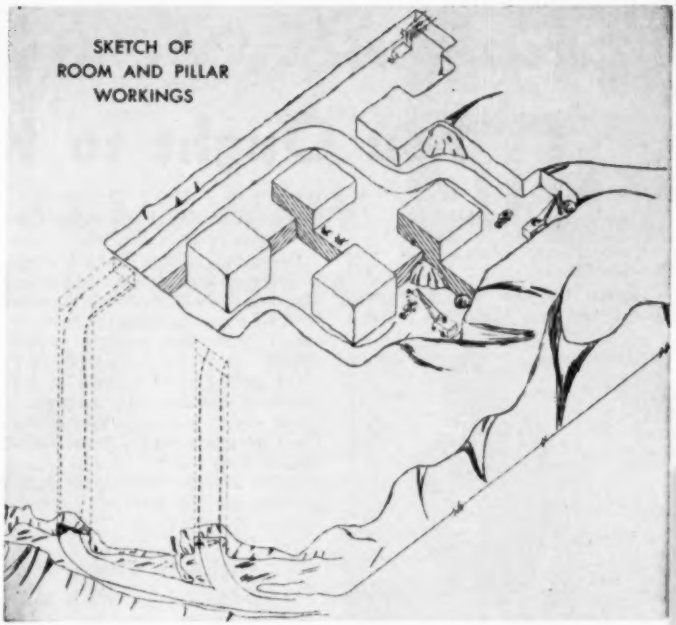
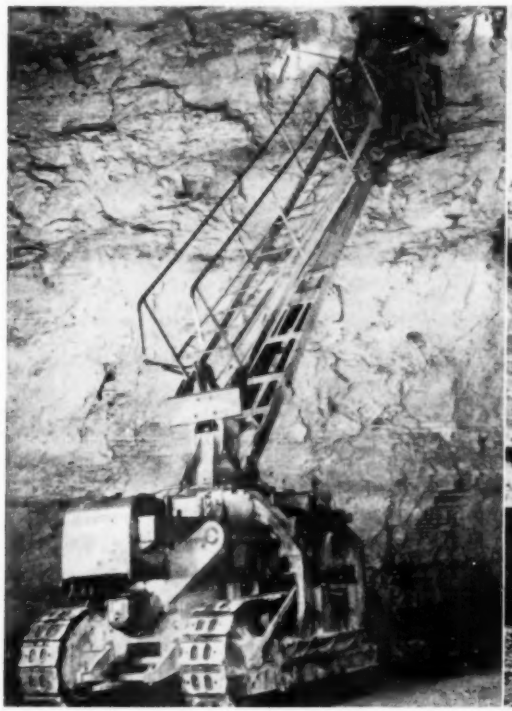
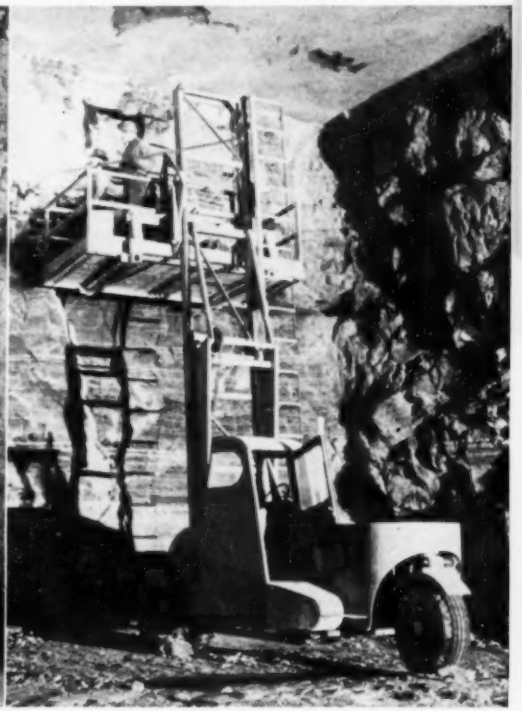


• Above: Bureau of Mines sketch shows layout of mine. At present only one shovel is being used.

• Below: Charging horizontal holes was solved with Wagner-mobile fork-lift truck mounting wooden platform. Two men load and blast a round in five hours. (Bureau photos)



• Close-up of portable scaler — a traveling crane with self-leveling platform mounted on International TD-9 tractor. Two men remove loose rock from roof and upper parts of pillars, using aluminum rods with steel tips. Percussion drill on platform is used to drill slabs of rock not easily pried off.



Equipment You Ought to Know About

Rod Cutter

Manufacturer: Manco Mfg. Co., Bradley, Ill.

Claims: The new "Guillotine" with special center cut blades is a portable

hydraulic hand tool which can cut ¾-in. reinforcing rod and 1-in. mild steel rod. This tool can also be obtained with a shear-type blade which will cut both wire rope up to 1¼-in. and mild steel rod up to ¾-in. The cutter can be adapted to perform crimping, swedging, and bending operations on large-diameter material. Little maintenance is required even under heavy usage.

Heavy-duty design features special forgings and high-tensile steel castings. The unit weighs 40 pounds. It operates by hand pumping, using the operator's weight rather than strength to make the cut.

Oil seals prevent leakage at both maximum pressure and at no pressure. Other design features assure positive blade retraction when release valve is opened after cutting and include a safety relief valve which automatically prevents possible damage to the tool because of overloading.

Highway Ditcher

Manufacturer: Gar Wood Industries, Inc., Findlay Division, Findlay, Ohio.

Claims: The Buckeye 616 Hi-way Widener cuts side ditch to grade in one pass without disturbing the base. A clean ditch is left ready for the paving material. Powered by a GM 67-hp diesel engine in conjunction with a fluid coupling the ditcher digs up to a mile a day of side ditch depending on soil conditions.

Heavy-duty digging wheel will dig up to 18 inches deep with cutting widths of 24, 30, 36, 42 and 48 inches. Reversible conveyor deposits spoil on either side of the machine as desired. The unit can attain speeds up to 20 mph.

The operator sits on a swivel seat from where he can see the digging wheel, highway edge and passing traffic.

Wrecker Balls

Manufacturer: Eagle Iron Works, P. O. Box 934, Des Moines, Iowa.

Claims: Wrecker balls or concrete

breakers, skull crackers and frost balls are made of close-grained, special semi-steel. These wrecker balls have a protective well at the top within which is a ring for fastening the crane cable.

Balls are available in weights ranging from 2,000 to 4,000 pounds. They are recommended for breaking old concrete slabs, wrecking buildings, smashing and consolidating mill scrap, for secondary breakage of shot rock in quarries, and for breaking large or frozen chunks of shale.

Anti-Freeze

Manufacturer: Stone Distributing Co., Division of Stone Motor Co., Coshocton, Ohio.

Claims: Winterset is a new 100% glycol base permanent anti-freeze. Boil-proof, one filling of Winterset lasts all winter. Formulated to meet heavy-duty needs of automotive and construction machinery cooling systems, it affords freezing protection into sub-zero ranges.

Chemical inhibitors prevent rust and corrosion. When used in accordance with instructions, Winterset is guaranteed not to clog cooling system passages. It will not harm body finishes or damage rubber hose. It will not leak

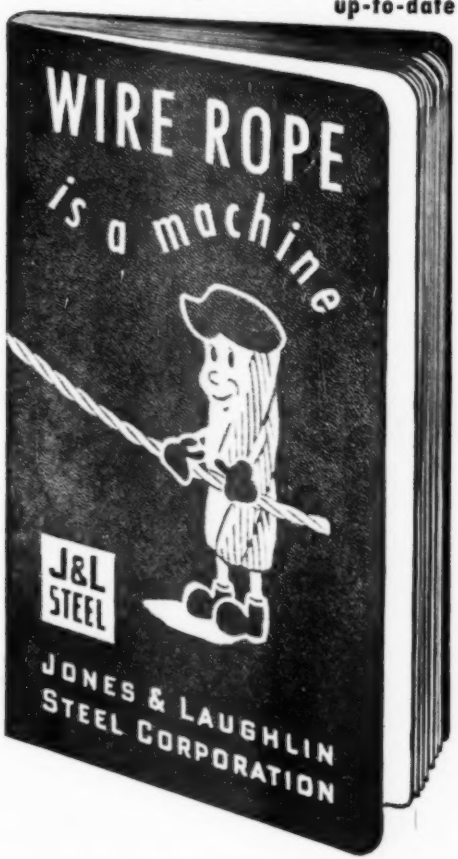
Continued on page 38

Get your copy of J&L'S NEW WIRE ROPE HANDBOOK

J&L STEEL

for the man on the job

Pocket size • easy to read • up-to-date



Here's the new illustrated J&L Wire Rope Handbook . . . written for the man who handles wire rope *on the job.* It contains 96 pages of information to help *you* get the most out of the wire rope on your machine.

It's easy to understand . . . it has the answers to many of your questions about wire rope . . . it's yours for the asking. Thousands of men have already put this book to good use. Why not send for your copy now?

It tells you about

- **installation and operation**
- **selecting the right rope**
- **J&L wire rope maintenance**
- **standard fittings, slings, and splicing service available with J&L wire rope**

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Excavating Equipment
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Please send me a free copy of the new wire rope handbook entitled "Wire Rope is a Machine."

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JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY (*hi-tensile steels*).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

This TD-24, shown spreading its load on the crest of an earthfill dam, speeds up work cycles from cut to fill. It turns in new records for profitable payloads. No other crawler tractor can match it in work capacity.

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

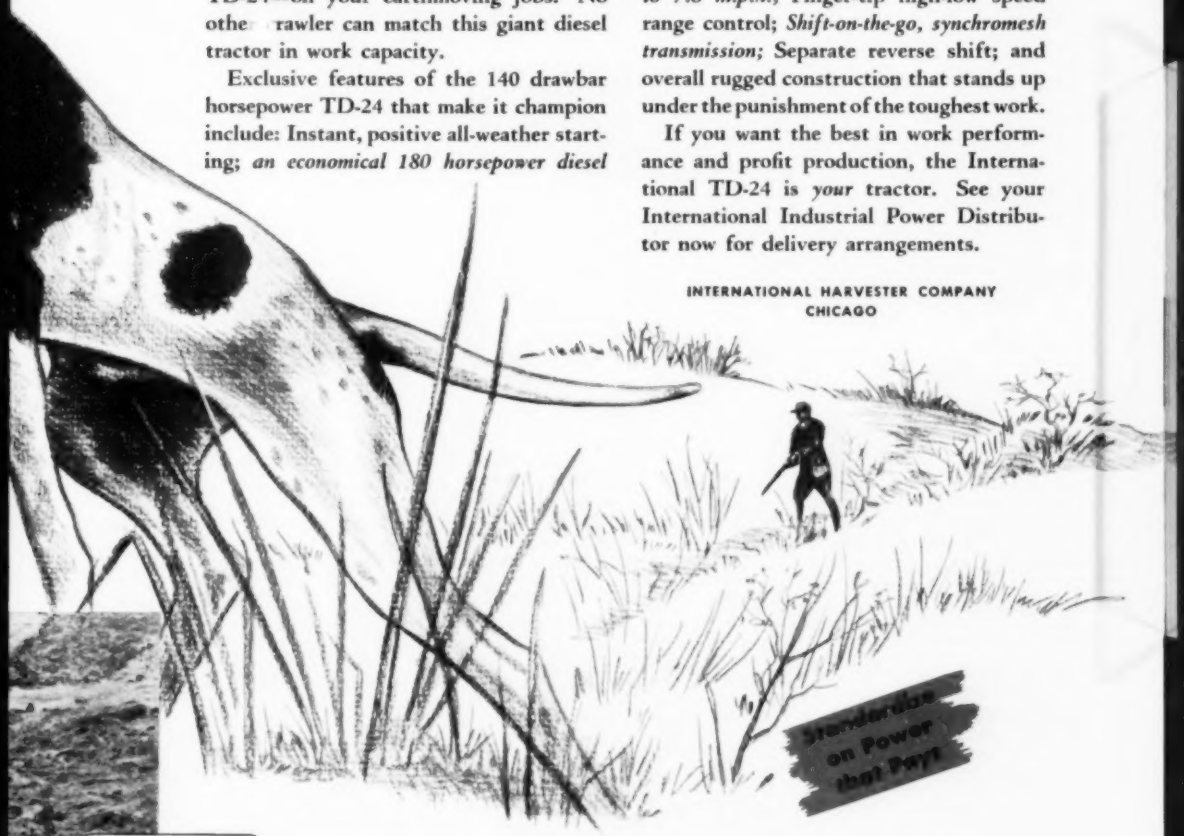
CHAMP

For a performance advantage that pays bigger profits, put the job-proved *champion* of all crawlers—the International TD-24—on your earthmoving jobs. No other crawler can match this giant diesel tractor in work capacity.

Exclusive features of the 140 drawbar horsepower TD-24 that make it champion include: Instant, positive all-weather starting; *an economical 180 horsepower diesel engine;* "Planet-power" steering which means greater drawbar pull on turns; *8 speeds forward and 8 in reverse with speeds to 7.8 m.p.h.;* Finger-tip high-low speed range control; *Shift-on-the-go, synchromesh transmission;* Separate reverse shift; and overall rugged construction that stands up under the punishment of the toughest work.

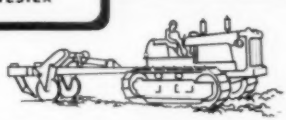
If you want the best in work performance and profit production, the International TD-24 is *your* tractor. See your International Industrial Power Distributor now for delivery arrangements.

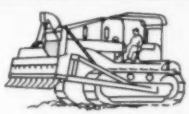
INTERNATIONAL HARVESTER COMPANY
CHICAGO



INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER





News from the Field

States Divert $189 Million From Road Funds

The National Highway Users Conference reports that last year diversion of special taxes paid by highway users increased 11% over 1947. The total diverted in 1948 was $189,370,000, figures from the Commerce Department's Bureau of Public Roads show. The 1947 diversion figure of $170,518,000 was an 81% jump over the 1946 amount.

Of the diverted money, some $97 million went to state general funds; about $41 million went to county and local general funds; $45 million was lumped under education, and $6 million went for other purposes (ranging from mosquito control to harbor improvement).

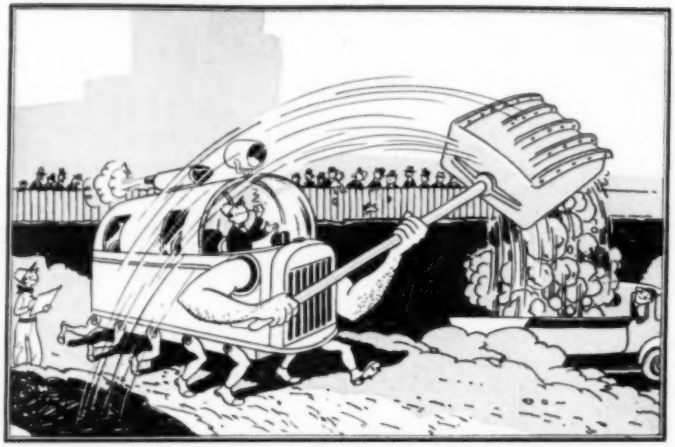
New York which lacks an anti-diversion constitutional amendment such as that in the law of 21 other states, was the biggest diverter. Some $71,444,000 paid in highway use taxes was not spent for highway purposes. This was almost half of the highway use taxes paid there. Rhode Island was a close second in percentage diverting 40.9% or $4,023,000. In that state a campaign is under way to impose a legal "ceiling" on diversion.

Florida diverted $23,141,000 or 36% of its highway use taxes; Delaware, $1,042,000 or 22.8%; the District of Columbia, $1,242,000 or 12.4%. All three lack constitutional safeguards for road funds.

Louisiana, which has the nation's highest gasoline tax — nine cents a gallon — diverted $4,301,000, or 11%. Tennessee, whose voters this year will have the opportunity to vote on a constitutional amendment prohibiting diversion, spent $5,084,000 in highway use taxes for non-highway purposes — 10.4% of special highway use taxes collected.

Torque Converters "Human"?!

A revolutionary change in the arrangement and method of operation of many types of power machinery as the result of a wider use of torque converters is predicted by F. G. Shoemaker, consulting engineer of the Detroit Diesel Engine division of General Motors, Detroit. The torque converter is a form of hydraulic transmission automatically adjusting the output of the engine to the task at hand. It contributed to the successful performance of tanks, tank destroyers and other heavy-duty mobile equipment during World War II.



• As the result of far wider use of hydraulic torque converter transmissions, "intelligent" machines with an almost human conception of motion are foreseen by F. G. Shoemaker, consulting engineer of Detroit Diesel Engine division of General Motors. Here is a cartoonist's impression of a power shovel which would employ some type of circular motion as man using hand shovel.

Shoemaker believes that we may expect to see machines with an almost human conception of motion as a result of the versatility made possible by further application of the torque converter. He predicts that power shovels might be designed to use the same circular type of motion as a real man employing a hand shovel instead of scooping up earth and rocks with straight angular motions like a robot or mechanical man.

"Characteristics of the torque converter make possible applications which allow sudden and frequent changes in speed and load which would be impossible with any other form of transmission thus far developed," says Shoemaker. "As a result of all these capabilities, we may see some startling changes in the next few years in earthmoving, logging, hoisting, industrial locomotives, railcars and many other types of equipment."

Bureau of Mines Finds Coal Reserves

In its 13th annual summary on coal research for the fiscal year 1948, the Bureau of Mines reported core drilling in the Pacific Northwest has shown a reserve of 13,600,000 tons of minable coal in Oregon and reserves of more than eight million tons of lignite in Washington of which 5,300,000 are considered minable by stripping methods. Investigations of coal deposits were also carried on in Rhode Island, Colorado, Maryland, North Carolina and Alaska.

To augment the depleted reserves of coking coal, the Bureau investigated methods of up-grading coals by removing undesirable constituents and tested methods of utilizing low-grade coals by blending with better coals. Complete carbonization properties were determined on two West Virginia coals as well as one each from Kentucky and Mexico. Tests were made on 47 other coking coals or blends of coking and noncoking coals.

The Bureau, in the past fiscal year, tested more than 6,800 coal samples and analyzed approximately 6,300 additional samples of coal and coal products in research on the mining, preparation and utilization of coal. The Bureau's fuel engineering service resulted in considerable savings in operating costs, particularly at Army and veterans' hospitals.

Safety Inspections

Assisting Federal coal mine inspectors in safety inspections of the Nation's coal mines, the Bureau analyzed nearly 15,000 gas and coal-dust samples requiring more than 100,000 individual determinations. Reflecting in-

creased civic interest in smoke abatement, the Bureau provided publications and consulting service for about 25 large and small cities in this country.

Testing electrical equipment designed for safe use in coal mines, the Bureau gave 55 approvals of permissible electrical equipment and made more than 1,600 tests of permissible explosives and blasting devices.

Develop Safe Storage Method

Cooperating with industry, the Bureau developed a method of storing subbituminous coal safely and compiled considerable data on the safe storage and transportation of lignite. The development of a flash-drying process for efficient removal of excess moisture from subbituminous coal and lignite offers promise of increased utilization of these low-rank fuels.

The summary also includes a report on the production of synthesis gas, research on use of diesel locomotives underground, underground gasification of coal and improvement in recovering thick-bed anthracite pillars now lost underground.

Results of the Bureau's coal research were reported by Arno C. Fieldner, chief of the Fuel and Explosives Division, and Sidney Gottlieb, technologist, office of the division chief, Washington, D. C. Copies of the publication, Information Circular 7518, "Annual Report of Research and Technologic Work on Coal, Fiscal Year 1948," may be obtained by writing to the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Stockpile Gravel For Pikes Peak Road

Near the summit of Pikes Peak, at 11,500 feet elevation, gravel is stockpiled for the maintenance of the top 2½ miles of the 20-mile highway that twists and turns up this famous landmark. Earthmoving equipment consists of an International TD-18 diesel crawler tractor with a Bucyrus-Erie Bullgrader, two International KB-6 dump trucks and a Quick-Way shovel.

Gravel is scraped from the mountainside by the Bullgrader and stockpiled for loading by the shovel to trucks. Throughout the season trucks haul the gravel for fills to make traveling safe — winter snows make rebuilding and repairing an annual job.

Superintendent on the job is Don Lawrie who says that "the cost of maintaining this highway and rebuilding those sections damaged by winter snows is unusually high. Since public funds are no longer available this cost is defrayed by a 50-cent charge to

• Left: Along way to top of Pikes Peak, at 11,500 feet elevation, Quick-Way shovel loads International KB-6 truck with gravel used in maintenance of road. International TD-18 diesel crawler with Bucyrus-Erie TD-18 cable-operated Bullgrader pushes material into pile for easy loading by shovel.

• Below: The tractor scrapes gravel from mountainside for stockpiling. Washouts caused by winter snows make it necessary to rebuild about three miles of the road each season.

every person who travels up Pikes Peak Highway. To open the road in the Spring requires the removal of approximately seven million cubic feet of snow. The drainage of the enormous quantities of water from melting snow along the highway and rebuilding each season some three miles washed out by this water is another costly procedure."

C. P. Fitzpatrick is job foreman.

Kenyon Forms Corporation

Howard Kenyon, Jr., formed the Kenyon Dredging Co., Inc., Bauxite, Ark., on August 1 as the successor to the partnership of Kenyon Dredging Co. which was dissolved on June 30. All partners in the company withdrew with the exception of Kenyon who purchased all the company assets on the same day.

Study Down Time On Tractor-Scraper Units

Equipment production studies made during the past two years on crawler tractor-drawn scraper units working on active rural highway grading jobs reveal that delays amount to 41% of the total available working time. The studies were conducted by the Production Cost Unit of the Bureau of Public Roads.

The percentage distribution of 3,900 hours of total available working time on 41 units on 11 different projects in seven eastern and southern states shows an average actual production time of 59%:

	Percentage of total available working time	
Time Element	*Range*	*Aver.*
Total available working time	100	100
Major delays	14-66	37
Net available working time	37-86	63
Minor delays	3-12	4
Actual productive time	31-78	59

The total available working time is the sum of normal daily shift time plus such occasional overtime as actually worked; major delays are individual delays of 15-minute duration or more; and minor delays are individual delays of less than 15 minutes.

• One of two International TD-18 diesel tractors operated by Marrow Bros. Construction Co., Henderson, N. C., hauls 8-yd. Athey crawler wagon with overburden for south shore section of Buggs Island Dam on Roanoke River. Contract calls for removal of some 125,000 yd. of overburden down to bedrock. Length of concrete portion of dam will be 2,785 feet and the earth portion, 19,572. Maximum height of the former will be 144 feet; the latter, 45. Length of shoreline at 300-ft. elevation will be 800 miles. The dam will have controlled flood storage of 1,345,000 acre-feet.

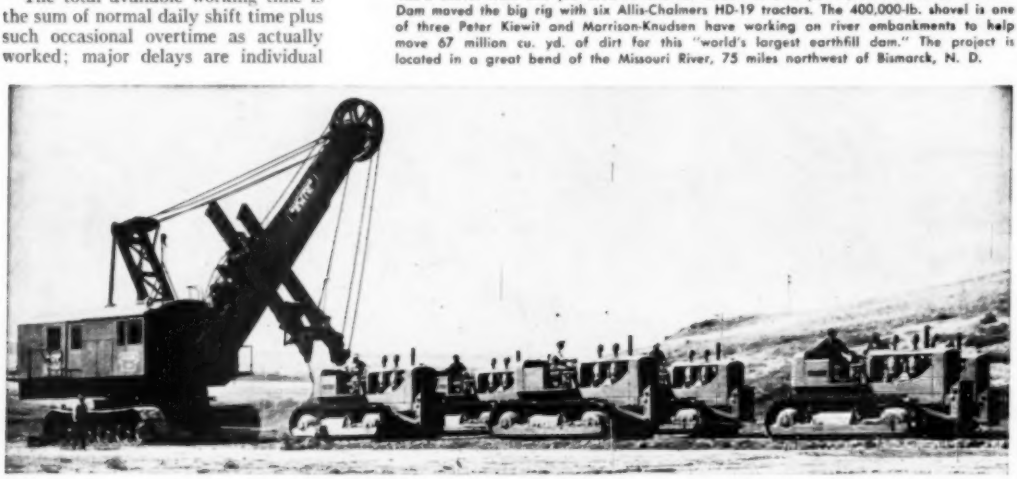
The extent of major delays of 15 minutes or more in duration due to various causes are classified:

Nature of major delay	*Percentage of total available working time*
Weather: rain, cold, wet grade	25
Maintenance and repair of unit	8
Waiting on auxiliary operations: clearing, placing pipe, rolling on fill, etc.	2
Other	2
	37

Of all major delays due to weather, approximately ⅓ was caused by wet grade.

Minor delays, ordinarily only a few seconds each in duration, amounted to 4% of the total available working time. When minor delays are expressed as a percentage of the total available working time, a job having frequent and extensive major delays, such as bad weather, tends to show a lesser percentage of minor delays than a job having a few major delays. Thus, a better basis for indicating the extent

• In place of stringing a temporary power line to allow moving this 5-yd. Bucyrus-Erie 120-B shovel from one job area to another under its own power, contractors at Garrison Dam moved the big rig with six Allis-Chalmers HD-19 tractors. The 400,000-lb. shovel is one of three Pater Kiewit and Morrison-Knudsen have working on river embankments to help move 67 million cu. yd. of dirt for this "world's largest earthfill dam." The project is located in a great bend of the Missouri River, 75 miles northwest of Bismarck, N. D.



GET MORE PAY DIRT 4 WAYS

with Bucyrus-Erie S-Type 4-Wheel Scrapers

QUICK LOADING . . .
You'll get big loads in short travel distance with the exclusive Bucyrus-Erie double-curve cutting edge. The blade's design "boils" the dirt up and keeps it on the move — distributing the load uniformly. You load more pounds of dirt per cubic yard!

FAST HAULING . . .
Rolling resistance is low because tires are of ample size to provide maximum, equalized flotation — a feature which helps the Bucyrus-Erie stay on top in soft going! Front and rear tires same size — interchangeable — meets Tire and Rim Association specifications.

SWIFT DUMPING . . .
Positive rolling action ejects dirt with greater speed. Dirt rolls back off the apron and forward from the bowl smoothly. There is no sliding forward of a dead load . . . no corners, no projections, no sidewalls to catch dirt.

RAPID TURNING . . .
A streamlined goose-neck permits a short turning radius . . . low fairlead sheaves eliminate tipping with winch lines when turning . . . a low center of gravity gives exceptional stability — these features add up to short, *fast turns.*

CAPACITIES: From 4 to 10 cubic yards.
Also available are B-type (front lift) scrapers, 17 and 22 cubic yards.

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

See Your INTERNATIONAL Industrial Tractor Distributor

● At eastern end of Squirrel Hill Tunnel, part of new William Penn Parkway through Pittsburgh, Pa., Northwest 6 crane positions a Blaw-Knox combination sidewall and arch form on Blaw-Knox traveller. This form makes it possible to pour arch and sidewalls simultaneously. B. Perini and Sons, Inc., Framingham, Mass., began concreting 3,785-ft. long north tube of motorway last September.

of minor delays in relation to the production operation is to express them as a percentage of the net available working time.

On the 11 jobs studied, minor delays varied from 4% to 16% of the net available working time with an average of 6%.

Nature of minor delays	*Percentage of net available working time*
Maintenance and repair of unit	2
Awaiting pusher	1
Maintaining haul road	1
Personnel	1
Other	1
	6

The size of the crawler tractors ranged from 70 to 150 drawbar hp and generally varied in proportion to the size of the scrapers which ranged from 8- to 19-cu. yd. struck capacity.

Use Combination Forms For Tunnel Pouring

Concreting operations on Squirrel Hill Tunnel of the William Penn Parkway began in September, scheduled to proceed at the rate of one 50-ft. pour per day. The contractor, B. Perini and Sons, Inc., Framington, Mass., is using Blaw-Knox 3-sectional telescopic combination forms for sidewalls and arches, each section 50 ft. 4 in. long. Sidewalls and arch are poured simultaneously by this method.

One Blaw-Knox traveller is being used for the placement, collapsing and transfer of the three units of wall and arch forms. A Northwest 6 crane is used to set up the forms on the traveller.

Pouring of the ceiling will follow lining of sidewalls and arch. After concreting, the sidewalls will be tiled to the ceiling.

Concreting was begun on the 3,785-ft. long north tube of the motorway proceeding from the eastern end. After the north tube is lined, it is expected that the south tube, which is 3,895 feet long, will be concreted in the reverse direction.

The roadway will consist of brick over concrete.

Tractor-Scraper Unit Works City Dump

The City of Colorado Springs, Colo., is solving its city dump problem by the trench and earth-cover method. An International TD-14 diesel crawler tractor equipped with a Bucyrus-Erie TD-14 Bullgrader and 3½-yd. G-38 rear-dump scraper work the dump southwest of the city.

First, a trench about 16 feet deep and 40 feet wide is dug and excavated dirt piled at either end. Refuse and garbage, brought in by various vehicles, is dumped at the edge of the trench. As this accumulates, it is bulldozed over into the trench and later leveled off at the bottom of the trench and tamped down by the tractor working back and forth until the refuse reaches a thickness of three feet. It is then covered with a 1-ft. layer of dirt brought down by the wheel scraper from the pile at the end of the trench and spread evenly.

When a trench is filled, a new trench is dug. Space is available at the dump for about 20 years' operation.

Behind these operations rises beautiful Cheyenne Mountain, on top of which is the Will Rogers Shrine of the Sun.

Cartoonist-Reader

One of *Excavating Engineer's* readers in Canada writes:

Dear Sir:

You will find enclosed two cartoons which I have drawn. I sincerely hope that they will be satisfactory for publication in your fine magazine.

I am connected with the Brunner Mond, Canada, Ltd., quarry division, and we receive *Excavating Engineer* monthly. I have been cartooning as a hobby for a number of years, mainly for the plant organ. To see my work reproduced in *Excavating Engineer* would be a feather in my cap indeed.

Yours truly,
GEORGE H. HORROBIN
Amherstburg, Ont.

Reproduced here is one of the cartoons. We're glad to put that feather in your cap, Mr. Horrobin.—*The Editors*

"Call a mechanic, my starter's locked!"

Scherffius Given New Post by Koppers

Supervising Engineer William S. Scherffius has been named personnel manager of the engineering and construction division of Koppers Company, Inc., Pittsburgh, Pa. As personnel manager, Scherffius will develop, direct, and coordinate personnel and labor relations policies and functions

on construction projects in his division.

A native of Lexington, Ky., Scherffius received his early education in the Rondebosch School and the Pretoria Boys' High School in the Union of South Africa where he resided for 15 years. He later received a Bachelor of Science degree in civil engineering from the Georgia Institute of Technology.

Scherffius joined Koppers as a cadet engineer in 1927. From 1934 until 1941 he was with the Government in labor activities, returning to Koppers in 1941.

Cableway Takes Men, Equipment to Excavation

An $80 million expansion program is underway 100 miles northeast of Seattle, Wash., to bring the generating capacity of the Seattle City Light Skagit River project up to 644,000 kw. A new surge tank is called for 1,800 feet above the company's powerhouse — a spot inaccessible by normal transportation methods.

But Guy F. Atkinson, San Francisco contractor on the job, is going ahead with the surge tank excavation anyway. A cableway was erected at a 30° angle to transport men and material to the site. The "skyline" crosses Skagit River and climbs 1,800 feet up Pyramid Peak. An operator rides in the gasoline-powered hoist car that hauls itself up and down the cableway.

One of the passengers was a ½-yd. Bucyrus-Erie 15-B shovel which is being used to move rubble out of the solid rock excavation, 57½ feet in diameter and 197 feet deep. The surge tank is part of a water power tunnel. The current project totals $3,189,000 and includes enlargement of the powerhouse, penstock tunnel, and appurtenant works for a new 60,000-kw unit expected to be in operation by Sept., 1951.

The region in which the project is set is described by geologists as one of the most rugged and inaccessible in the United States and is often compared to the Swiss Alps because of jagged bare rock peaks and numerous permanent glaciers.

But the men who are doing the earth-moving at Skagit River Gorge have found a way up and around those "inaccessible" points.

• Above and Left: Skyhook on cableway picked up this 15-ton Bucyrus-Erie 15-B shovel off flatcar on Skagit River Railway, carried it across river and 1,800 feet up Pyramid Peak, on an approximate 30° incline. Shovel was only one of passengers on cableway which carried both men and material from Seattle's City Light powerhouse to an otherwise inaccessible construction site for a new surge tank. Guy F. Atkinson, San Francisco, holds contract for job which is about 100 miles northeast of Seattle, Wash.

NO time-out for CLUTCH ADJUSTMENTS

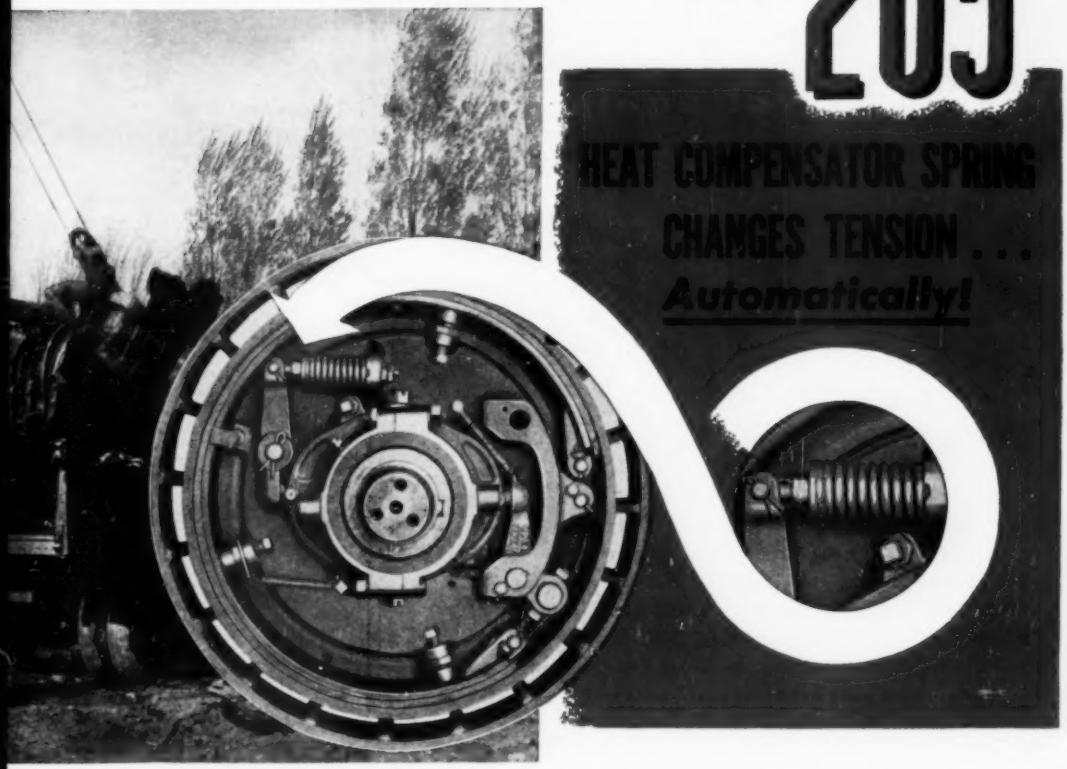
KOEHRING DUMPTORS* have the same heavy-duty qualities and big-production ability as Koehring excavators . . . combined, they give you matched excavating-hauling efficiency. Rugged 6-yard rock body . . . plus a ton of Dumptor strength for every ton of payload, withstand severest shocks of shovel loading and roughest off-road hauling. Constant-mesh transmission and 3 fast speeds, forward and reverse, provide no-turn shuttle hauling. 1-second gravity dump saves more time every trip.

*Trademark Reg. U. S. Pat. Off.

KOEHRING COMPANY
Milwaukee 10, Wisconsin

Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

with KOEHRING HALF-YARD 205



With Koehring ½-yard 205, there's no time-out for continuous manual clutch adjustments. It's no longer necessary for operator to tighten cold clutches when he starts in the morning, or between shifts . . . then loosen them again when clutches warm up. Large compensator springs on the 205's main drum (above), swing and traction clutches automatically make all tension changes . . . maintain full clutch efficiency. No "compromise" settings . . . you get top production all through the shift . . . have accurate, smooth control at all times. Gives you bigger daily yardage as shovel, dragline or pull shovel . . . is equally important on clamshell and heavy lift crane service, where you have intermittent usage.

Also, with Koehring 205 you get double-fulcrum control linkage on crowd-retract and traction that eliminates overtravel, drag and chatter . . . independent traction, to travel, swing and operate boom all at same time . . . full choice of crawler, truck or cruiser mounting to best fit your operating requirements. Your local Koehring distributor can show you many other 205 features that will save time and assure more production at lower cost on your work. See him *today*.

K900

OTHER KOEHRING EXCAVATOR SIZES: ¾ yd. 304 • 1½ yd. 605 • 2½ yd. 1005

How to DOUBLE EFFICIENCY of your snow removal equipment

Last winter's big snows proved beyond doubt that La Crosse trailers can practically double the efficiency and working range of slow-moving snow plows, dozers, loaders, etc. By purchasing *extra* trailers now, you can move your big equipment where it's needed FASTER . . . get it working QUICKER . . . on to other jobs WITHOUT COSTLY DELAYS. Moreover, you keep your investment low . . . have extra trailers for year-'round utility.

You'll find heavy-duty La Crosse low boys especially well fitted for winter hauling because they *trail easier on slippery roads . . . are easier to load and unload . . . have extra-capacity, flat-platform gooseneck for carrying spare tires, sand, cinders, etc.* Choice of single, dual or tandem axle design from 6 to 67 tons capacity—standard or custom-built. May we discuss your requirements . . . *now?*

LC-9

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LA CROSSE TRAILER CORPORATION, La Crosse, Wis.

☐ Rush complete details on LaCrosse Trailers ☐ I may be interested in a.....ton trailer about..... (date)

for hauling..... (type of equipment)

Name.....Title.....

Employed by.....

Address.....

City.....State.....

LaCROSSE

Low-Cost TRAILER TRANSPORTATION

New Equipment

Continued from page 26

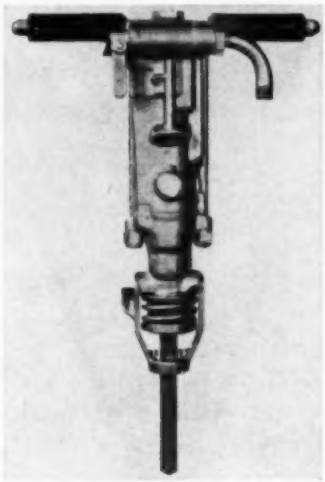
out of a cooling system that does not leak water.

Winterset is available in 1-gal. sealed cans and in 54-gal. drums.

Sinker Drill

Manufacturer: Gardner-Denver Co., Quincy, Ill.

Claims: A new 45-lb. class sinker, known as the S48 is said to have drill-



ing, rotating and hole cleaning characteristics that make it especially suitable for use with tungsten carbide rock bits. Performance tests show that the S48 sinker equals most 55-lb. drills in drilling speed and rotative power.

Designed for either wet or dry drilling, the S48 can be changed from wet to dry or to automatic air-operated water control by changing a removable gland and tube. The conversion can be made without taking the drill apart and without changing the backhead.

Tilt Deck Trailer

Manufacturer: Rogers Bros. Corp., Albion, Pa.

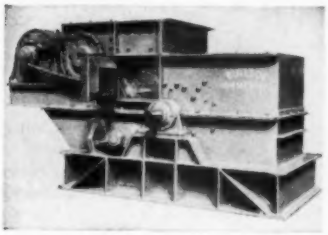
Claims: A new tilt deck trailer carries four 8.25x15 14-ply tires and has a capacity of seven tons. Road clearance is 16 inches. The deck is 16x8 ft. and 34 in. high. Air or vacuum brakes are optional.

Another feature is the double-acting hydraulic ram which cushions the deck when being raised or lowered.

A 5-ton trailer is also available equipped with 7.50x15 10-ply tires.

Crusher

Manufacturer: Hammermills, Inc., 1021 Big Bend Blvd., St. Louis, Mo.



Claims: Bulldog non-clog, moving breaker plate Hammermills are suitable for primary, secondary or fine reduction. Built in sizes to handle 1 to 1,000 tons per hour, Hammermills will crush, shred or pulverize any crushable material regardless of moisture content or plasticity. The Bulldog stationary breaker plate Hammermill will handle any dry crushable material.

Units are designed and built to fit the particular job on which they will be used.

(When this item appeared in our August issue, the word "primary" was inadvertently omitted.)

Welding Rod Package

Manufacturer: All-State Welding Alloys, Co., Inc., 273 Ferris Ave., White Plains, N. Y.

Claims: A new standard package for All-State welding rods and electrodes is a metal capped tube. It replaces all the fibro-board boxes previously used for All-State products. These tubes will withstand rough handling. Design of the tube includes complete instructions for use printed on its outside.

Pipe Cutting Saw

Manufacturer: Porter-Cable Machine Co., Syracuse 8, N. Y.

Claims: The Speedmatic saw is equipped with a new type wheel which is abrasive throughout the entire body of the blade. The unit deeply scores even the heaviest cast iron pipe.

The saw is adapted to follow the contour of the pipe. Either blocks or rollers can be attached to the front and back of the standard saw base. The abrasive wheel is then adjusted for the cut with the micrometer set screw which raises or lowers the blade exactly 1/8 inch for each full turn.

Tile or concrete pipe, bricks, cement and cinder blocks can also be cut with the Speedmatic saw. Another special blade for this saw allows it to cut sheet aluminum, galvanized or corrugated steel, and aluminum siding or roofing.

Actually the saw is a standard port-

BUCKING and LUGGING

show what an engine's made of!

...and this new Oshkosh snow removal truck proves the power and stamina of the Hall-Scott 400

An engine that can shove around tons of snow can do a mighty good job on other heavy jobs, too . . . trucking, lumbering, quarrying, excavation work.

Read, then, what Oshkosh Motor Truck Co. has to say about the Hall-Scott 400 in the new 54,000-lb. GVW Oshkosh Model W-2206:

The snappiness of the engine permits shorter runs in bucking, due to rapid acceleration. Extra lugging power, too, permits plowing hard snow 3 or 4 feet deep without bucking.

That's the kind of power that means greater dependability . . . higher speed on grades . . . lower maintenance costs! Get *all* the facts on Hall-Scott. Butane or gasoline equipped.

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ACF-BRILL MOTORS COMPANY

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HALL POWER BY SCOTT

EASY TO ASSEMBLE

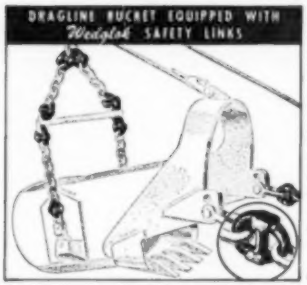
Wedglok

PATENTED

CONNECTING LINKS

SAFETY • STRENGTH

• SIMPLICITY • ENDURANCE



An improved connecting link that combines safety and simplicity. Its strength exceeds the published strength of comparable alloy chain.

WEDGLOK links can be assembled rapidly on the job—no special equipment required; particularly useful for dragline buckets, slings and other equipment with chain or wire rope attached.

Regular and pear shape. Sizes ⅜" to 3"

Available at your local distributors

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How To Solve Problems of Digging and Moving All Kinds of Materials with a SAUERMAN POWER SCRAPER

(Above) This shows how a Sauerman Rapid-Shifting Scraper Machine makes easy work of digging long, wide cut into hill of hard-packed gravel. (At Right) 35,000-ton radial stockpile is handled by 2 cu. yd. Sauerman Scraper Machine using self-propelled tail car for rapid shifting of path of scraper.

Have you a problem in pit excavation, strip mining, cut-and-fill, pond cleaning and the like? Then you will find Sauerman Catalog 19-A a valuable guide on how to cut costs on this type of work with a power drag scraper machine. Specifications of different types of scraper machines. Operating principles explained, with special reference to Sauerman Rapid-Shifting Scrapers.

Perhaps you also have a stockpiling problem. If so, you need the new Sauerman Catalog 19-E which is for all practical purposes a textbook on how to store and reclaim bulk materials with a power drag scraper. About 100 layouts are shown, handling everything from ash to heavy ores. Capacity charts and cost data for the engineer.

Write Now for These Free Catalogs

SAUERMAN BROS., Inc.

574 S. Clinton St. Chicago 7, Ill.

able electric wood-cutting saw which, in addition to the above specialized applications, can be used for all construction cutting. It is available in four sizes: K-75 cuts 2½-in. pipe; K-89, 2¾-in.; BK-10, 3¾-in., BK-12, 4¾-in. All saws are adjustable for cuts between 0° and 45°.

Lightweight Diesel

Manufacturer: Harnischfeger Corp., Diesel Division, Port Washington, Wis.

Claims: A new 2-cylinder, 2-cycle diesel has an engine cylinder head and liner unit with a 4½-in. bore by 5½-in. stroke. The cylinder head is interchangeable from one engine to another and is removable in a period of 40 minutes. Liners are of hardened steel alloy.

The entire assembly is completely water jacketed and thoroughly cooled. Water travels upward in the liner and passes between each intake port, controlling the temperature at that point. Intake ports are machined on a compound angle sending the air from a root-type blower into cylinder in a strong, swirling motion, providing

scavenging of exhaust gases and complete combustion on next stroke.

The engine is 28¼ inches wide, 40⅞ high and 32¼ long. Weight, complete with a cast light metal alloy block is 1,030 pounds. Hp rating is 52.5 at 1,400 rpm. The unit operates on a 16 to 1 compression ratio with a displacement of 174 inches.

Injectors and fuel injector pumps are standard. Each individual injector has a large spray hole to eliminate clogging difficulties. One injector for each cylinder is conveniently located for changing when necessary. The injector pump is demountable. These units are interchangeable from one engine to another.

The engines are recommended for road grader application, crusher and screening plants, besides the regular use in power units.

Speaking of Dragline Buckets

Here's THE RECORD!

At a large bituminous strip coal mine using a Bucyrus-Erie 1150-B walking dragline, the Bucyrus-Erie 25-cubic-yard bucket shown here was alternated with the same size bucket of competitive manufacture. The buckets were kept on the excavator until major shop repairs were required. Here's the comparison:

	Bucyrus-Erie Red Arch 25 cu. yd. dragline bucket	Competitive 25 cu. yd. dragline bucket
Minimum Time on Machine	1018 hours	162 hours
Maximum Time on Machine	1644 hours	1291 hours
Average Time on Machine	1293 hours	581 hours

A Record — Not For 30, 60 or 90 Days But For 20½ MONTHS!

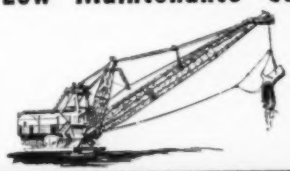
These are actual digging hours during the 20½-month period from Sept. 4, 1947, to May 19, 1949 — The *durability* of the Bucyrus-Erie 25-cubic-yard dragline bucket is almost 2¼ *times* that of the competing bucket.

and Over this period the 1150-B averaged 67.93 cycles per digging hour with the Bucyrus-Erie Red Arch bucket and only 63.64 cycles per digging hour with the competitive bucket. Furthermore, high single shift, high triple shift and high month output records were established with this Red Arch bucket.

24R49C

Choose BUCYRUS ERIE **Red Arch Dragline Buckets**

For **Durability**
High Output
Low Maintenance Costs



BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin

"Turnabout"

Continued from page 16

50-ft. booms. So Stacy has put all five machines to digging down to grade, removing the old embankments and disregarding the center material. A rough twin channel separated by 10 to 20 feet of earth is the end result. When a half mile or so is completed in this manner—and it's a speedy job—the 38-B and 37-B with their 60-ft. booms double back to remove the center strip and to level the channel bottom—operators can reach out 75 feet by casting out the dragbuckets.

Doing two jobs, the 38-B and 37-B work 24 hours a day while the smaller machines operate an 8-hour stint. Five to seven thousand cu. yd. come out of the channel every 8-hour shift.

Compaction of "Dikes"

Part of the eight miles of channel is in low areas where its banks are "dikes." Here the contract calls for compaction. Stacy decided to do the compaction with the weight of tractors and scrapers. Verne Clifford, dozer superintendent, is using three such units—a 16-yd. Caterpillar 80, a 13-yd. LeTourneau J-13, and an 8½-yd. LeTourneau LS drawn by two Cat D-8's and one D-7. One International TD-6 dozer with a blade built by the contractor assists these machines.

Moving up and down the areas calling for compaction, the three scrapers lay a 6-in. layer at a time on the embankments rolling the material down by making enough passes with their tires and tracks to insure the required compaction. The contract specifies 100,000 yd. of embankment compaction at 25 cents per cu. yd. or $25,000. As the machines are already on the job, they will also assist the draglines by moving approximately 300,000 cu. yd. of general excavation in the vicinity of the compacted fills.

Add Moisture

Specifications call for at least 95% optimum compaction in the core bank fills. This requires control of the moisture which is generally about right after the dry surface material has been removed. This surface material requires the addition of as much as 20% water. A 6-in. LeRoi gas-powered pump feeds the water from adjacent sumps and channels to handheld hose nozzles carried along the old banks. The pump is moved from place to place as required by a Dodge Powerwagon equipped with a 28-ft. homemade boom.

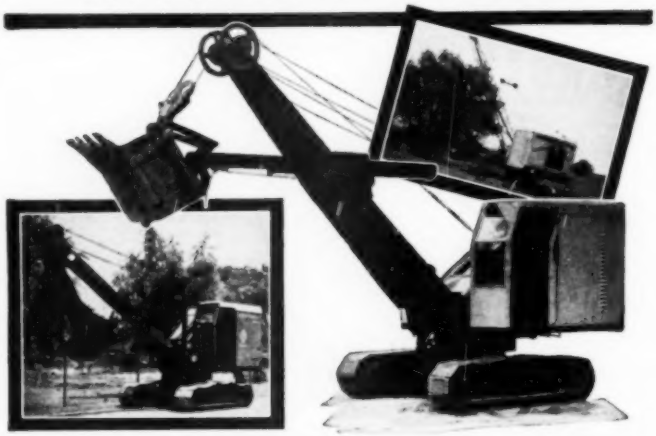
Compaction results are very good, resulting in better than the required 95% optimum density which, in the material found in this locality, is from 75 to 108 pounds per cubic foot dry. The soil contains considerable light weight pumice dust and diatomaceous material and the resulting permeability is very low.

Secondary Excavation

Secondary excavations are dug mainly by the draglines. Forty-one thousand cu. yd. are to be moved at a bid price of 14½ cents per cu. yd. in the excavation of adjacent laterals and drains. Excavation for structures and riprap is specified at $1.50 per cu. yd., the total earnings being estimated at $14,700. Placing earth plugs in the channel—to dewater for the main excavation and all incidental structures—and removing them is on a lump sum bid price of $5,000. Other necessary protection is also included in this total.

An item that has been carefully planned to prevent complications is the problem of irrigation. The original diversion channel is in use—its water must continue to flow in certain

A PIONEER
of Small Excavating Equipment
...AND STILL A LEADER!



GENERAL SHOVELS, DRAGLINES, CRANES, ETC.
Diesel, Gas, and Electric Powered . . . Wheel and Crawler Mounted. ½ and ¾ Cu. Yds.

Generals have always been known for speed . . . for strength and power . . . for flexibility . . . for the ability to take punishment day after day and still give uninterrupted performance. Constant improvement of the product through new engineering developments, has added to that reputation.

A typical General achievement is the self-propelled one-man, one-engine crane, on rubber. Similarly, the new General crawler-mounted shovels, cranes and draglines, etc., are making an enviable record of out-performing all other types of equipment of comparable rating. Write today for the latest details.

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THE OSGOOD CO. O-G THE GENERAL CO. EXCAVATOR
MARION OHIO
DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

reaches. As it flows backward and forward at different seasons, different areas can be dewatered during different months. But the entire channel must be left open at full capacity from November 15 to near June 15 to accommodate possible winter and spring flood flows which means that the job must be done during summer and fall months.

Move Buildings

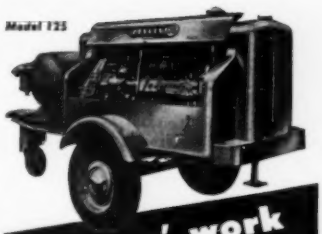
Four ranch buildings, sheds and barns, had to be moved to make room for the channel excavation. As this was not included in the contract, it was done on a separate Bureau of Reclamation job order.

As widening of the channel encroached on existing structures in some places, the contract specified the removal of some of them. Stacy is doing this by cutting down the concrete with drills. He brought in one 105-cfm Joy WK-80 air compressor and two jackhammers—a Sullivan 57 and a Worthington WJ-55—for this job.

No loading or hauling of excavated material is necessary except for that by the three tractor-scraper units so Stacy has only three dump trucks on the project, two 1½-ton Chevrolets and one 1½-ton Ford. All three do miscellaneous jobs on the small riprap and structural items in the contract. The one Dodge Powerwagon and three to five pickups fill out the vehicle list.

One complication did arise last summer. Though going full speed, Stacy had another dragline operation—a 93,000-cu. yd. excavation on the Klamath Straits Drain, a similar but smaller canal enlargement on the Klamath Project. Stacy had dug the original Klamath Straits Drain in 1945. The job was 14½ miles away, across the farm and desert lands with only county roads in between. The 38-B was the machine chosen to do this job, but the machine could not pass over the county bridges to get there if carried on a trailer.

So Stacy walked the dragline the entire 14½ miles. It started out on the 7th of June, moving down the roads, bypassing or planking over the various bridges, taking time out only for greasing on the way. Twenty-two hours later it was on the job. The Straits Drain was good digging without rock or hardpan — the excavation moved along at 2,230 cu. yd. every 8-hour shift. The entire 93,000-yd. were finished June 25. The machine



4 days' work now done in 3

with JAEGER "new standard" compressors

Jaeger Model 125 runs 2 heavy duty or 3 medium breakers at full 90 lbs. pressure, doing 30% to 40% more work than at 70 lbs. pressure from a 105 ft. machine.

Other Jaeger "new standard" sizes, 75, 185, 250, 365, and 600 ft., give you comparable work increases. Cost no more than smaller old sizes. Send for Catalog and prices.

THE JAEGER MACHINE CO.
Columbus 16, Ohio

DIG REAL DIVIDENDS!

WELLMAN
Williams Type
Welded Buckets

Operators prefer the Wellman Bucket for its balance, easy handling, and digging power. Owners prefer the Wellman Bucket for its bigger payloads, lower maintenance cost. These features are not accidental. Wellman pioneered in welded construction of rolled steels which make these buckets lighter, stronger, for greater yardage at lower costs. In all types and sizes, you'll do better with a Wellman!

There's a Wellman Bucket for every service

THE WELLMAN ENGINEERING COMPANY
7002 CENTRAL AVENUE CLEVELAND 4, OHIO

then walked back to continue on the diversion channel.

The half of Stacy's crew on structural work is keeping up with the excavation. First concrete pour on the project, for two canal turnouts, was made only 15 days after the contract was received.

The headworks of the diversion channel is a fairsized and complicated concrete job. The Stacy crew started on July 8 placing the forms and steel under structural super, Philbert Rogers. The actual pouring, 650 cu. yd. of concrete—all top-poured—is on a subcontract to David A. Richardson, Klamath Falls cement contractor, along with all other pourings on the channel.

The job consists of building entirely new headworks 65 feet behind the original and smaller headworks. When it is finished, the old structure will be broken up and removed. Three 14x14-ft. radial gates, electric-controlled, will be in the new structure.

For miscellaneous trenching and excavating for concrete forms, a unique system is being used. The local hardpan makes tough digging by hand. A Ford farm tractor was brought on the job, equipped with a 12-in. Dearborn 22-11 earth auger on the rear and a 10-cu. ft. Dearborn 19-8 bucket loader on the front. Both of these attachments are hydraulic-controlled. The bucket is used to scoop away material from the forms and to dig short trenches. Whenever hardpan is encountered, the earth auger is used to dig series of 12-in. holes through it before the bucket handles the material. The tractor is able to drill 50 postholes an hour.

Maintenance Setup

Maintenance of heavy equipment has been given special care because dust and sand are everywhere. Dragline tracks are greased once a day and everything else on the machines is greased every four hours. The scrapers are given similar treatment. Associated fuel and grease are used throughout the project.

As the 38-B and 37-B draglines are operating on a 24-hour schedule, they require considerable fueling. The maintenance man came up with a new trick for pumping fuel into the machine's tanks. Removing the crank from the fuel pump which is built into the draglines, he chucks a ⅝-in. electric drill on the pump's shaft and thus rapidly power-pumps fuel into the machine. Night floodlighting is taken care of by 1½-kw Kohler light plants mounted on the draglines. This source of power is also used for the electric drill.

Crawford, the Bureau's field engineer, observes that this contractor's jobs are always well organized, that his men and machines produce results.

All that Stacy will say himself is that the job will be cleaned up ahead of time.

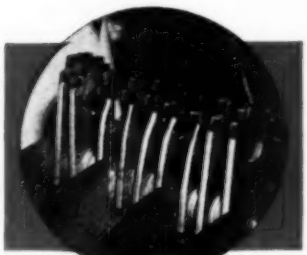
FOR HARDFACING AND REPAIR

Amsco WELDING PRODUCTS

TUNGSITE
Tungsten Carbide
INSERTS

FOUR WEEKS—*instead of only four days*—now that these hammers are tipped with Amsco Tungsite Inserts! Imagine how this 600% longer hammer life, with its reduction in machine repair and down time, has cut the costs of pulverizing asphalt roofing trimmings.

Amsco Tungsten Carbide welding products are available as Inserts . . . or as Tungrod and Tube Tungsite hardfacing rods and electrodes. To meet all job needs . . . Inserts are available in a wide range of shapes and sizes . . . and Tungrod and Tube Tungsite are supplied in a variety of mesh sizes. Recommended for resistance to extreme abrasion, or when a serrated cutting edge is required. Outstandingly successful on rotary drill bits, plow shares, cane knives, muller plows, pug mill knives, hammermill hammers and similar parts.



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Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. Made and sold in Canada by Canadian Ramapo Division of Joliette Steel Ltd., Niagara Falls, Ont.

Underground Quarry

Continued from page 25

a depth of 3/16 inch measured from the original reaming points toward the seat of the bit. Hardsurfacing material was then welded to the prepared cutting edges and reaming points. The entire mass removed from the original bit was replaced, and, in addition, a thin film of hardsurfacing was welded to each reaming surface. Welding was done by an acetylene torch with a Smith 73 welding tip. After the hardsurfacing had solidified and cooled, the excess was ground off with an emery wheel; the bits then had the size and shape of the original bit.

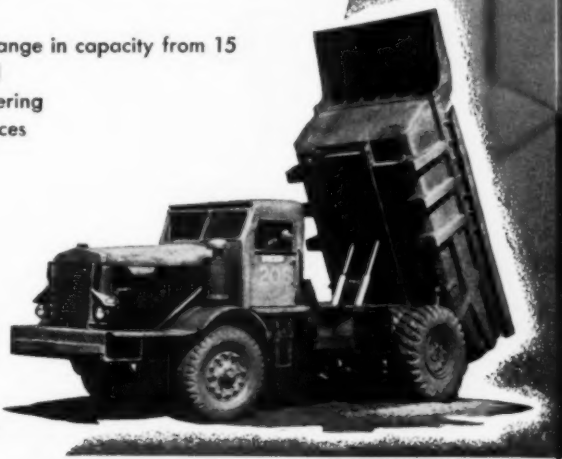
The application of the hardsurfacing

For greater
SPEED...
STABILITY...
SMOOTHER RIDING...

SPRING MOUNTED REAR-DUMP EUCLIDS

This new line of spring mounted Rear-Dump Euclids is designed for greater speed and stability on the haul road and long life in off-the-highway service. Heavy leaf springs are free floating in spring brackets to assure smooth riding and prevent breakage caused by twisting action on rough roads. Axles are positioned to the frame by longitudinal radius rods.

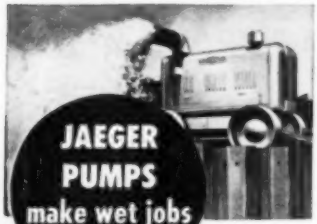
Rear-Dump Euclids with spring mounted drive axles range in capacity from 15 to 34 tons . . . diesel engines to 380 horsepower . . . and have travel speeds up to 32.2 m.p.h. Hydraulic booster steering assures positive control over all road conditions and reduces driver effort on sharp turns and rough hauls.



Built to the same high standards of construction and design that have made "Eucs" the favorite for tough hauling jobs, these improved models provide outstanding performance and lowest cost per ton or yard moved. Your Euclid distributor will be glad to show you how Euclid equipment can help cut your hauling costs and make more profit for you.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO
CABLE ADDRESS, YUKLID. CODE: BENTLEY

New 2" aluminum pump weighs 105 lbs., pumps 9000 gph . . . Gives high head performance for price of low head pump.



JAEGER PUMPS make wet jobs dry

Extra power and double priming action to de-water faster. Built to outlast cheaper pumps by thousands of hours.

Heavy duty 2" to 10" models for low or high head requirements. Super-Jet pumps for pressures to 275 lbs. Diaphragm and caisson pumps. Get catalog.

THE JAEGER MACHINE COMPANY
Columbus 16, Ohio

drew the temper from the original bits and they were retempered as follows: First, by heating at a temperature of 1,450° F. for half an hour; second, by quenching in ⅜ inch of water at room temperatures until all color left the seat of the bit; third, by cooling in air until at room temperature; fourth, by annealing at a temperature of 300° F. for one hour to relieve stresses caused by quenching. On cooling, the hardsurfaced and retempered bits were ready to use.

Bits Lose Less Gauge

By January, 1948, the method had advanced to the point where good bits were produced consistently. Six 18-ft. holes, or 108 feet of hole were drilled with a single hardsurfaced bit without appreciable reduction in drilling speed. After 200 feet of drilling, a loss of 30% in drilling speed and 1/64 to 2/64's of an inch in gauge was noted. The loss of drilling speed was caused by wear of the reaming point and bit threads.

All research was done with a Gardner-Denver UMB-D-99W wagon drill using 1¼-in. hollow, round lugged drill rods in 6-, 12-, and 15-ft. lengths. Cost of hardsurfaced bits is $.0075 per foot of hole drilled, ¼ the cost of ordinary bits. The principal saving, however, came in the time saved in changing drill rods and bits and shifting position of the drilling rig.

Oil shale, though tough, is relatively soft. The bits would require modification for use in a hard, brittle rock, but apparently they can be used for drilling many types of softer rocks such as limestone.

Develop Multiple-Drill Carriage

Drilling horizontal holes 25 feet from the floor of the advance heading was another problem that had to be overcome. A new type of multiple-drill carriage (or jumbo) was designed and built on contract. The unit has two platforms mounted on a framework on the rear of a diesel truck. Each platform contains two 4-in. percussion drills mounted on 11½-ft. feed slides. The vertical inclinations of the feed slides are controlled by screws and ratchets. Air hoists are used for lowering and raising the platform; spur gear devices permit swinging the platforms to various horizontal angles. A water tank and air hose reel are also mounted on the truck. Two men operate the four drills on the carriage.

Prior to the development of the multiple-drill carriage, drilling on the top level was done with conventional wagon drills which required two men each. Over 10 man-shifts were needed to drill an 84-hole round with 10-ft. steel. Two miners using the multiple-drill carriage put in the same 10-ft. round in about five hours—such a round breaks 1,000 tons of shale. This was the achievement at the end of last year.

Use 15-Ft. Drill Slides

Longer drill slides have been designed for the multiple-drill carriage since then. With these slides two miners drill a 72-hole round of 15-ft. holes in the 27x60-ft. heading in six hours. This round breaks out 1,500 tons—what the shovel and three trucks can load out in one shift.

Another jumbo mounting four drills and also operated by two men has been devised for sinking vertical holes on the bench level.

Although breakage of the long drill rods because of fatigue appears about normal, the cost per ton mined is high. Experiments using an alloy drill steel have been discouraging—no available furnace is long enough for the 15-ft. rods. One test with an Ingersoll-Rand type 2 insert bit brought up the life span of the rod—the bit maintained a

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sharper cutting edge than the hardsurfaced bit, thus reducing fatigue shock. The bit has drilled as much as 1,680 feet without apparent damage or dulling.

Test Auger-type Bits

Another research program is seeking a method of drilling the shale with rotary drills equipped with auger-type bits. Their use achieves higher drilling rates, less drill rod breakage, and deeper rounds at no loss of drilling speed. They also eliminate the noise of the percussion drills and substitute electric power for the costly compressed air now necessary.

All auger-type bits tested so far dull in three to five feet of drilling in the lower grade oil shale in the Ledge. One exception is the Cyclone masonry bit manufactured by the New England Carbide Tool Co. It drilled 70 feet at 33½ inches per minute before resharpening was necessary. However, to compensate for the higher cost of auger-type bits, they should be able to drill holes at double the rate of percussion drills which has been as much as 27 inches a minute with the hardsurfaced bits.

Cost of Explosives

Cost of explosives was another high-expense factor which had to be considered. The goal set at the beginning of the project was ½ pound of explosives or less for each ton of oil shale broken.

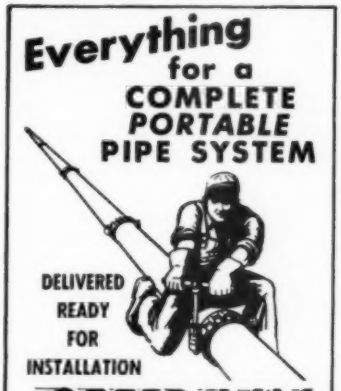
Early blasting experiments were made with 45% DuPont Gelex No. 2, 40% Gelex No. 3, and Extra C and Extra C-1 explosives. Best fragmentation resulted from the 45% Gelex No. 2 with about .5 to .6 of a pound required for each ton blasted.

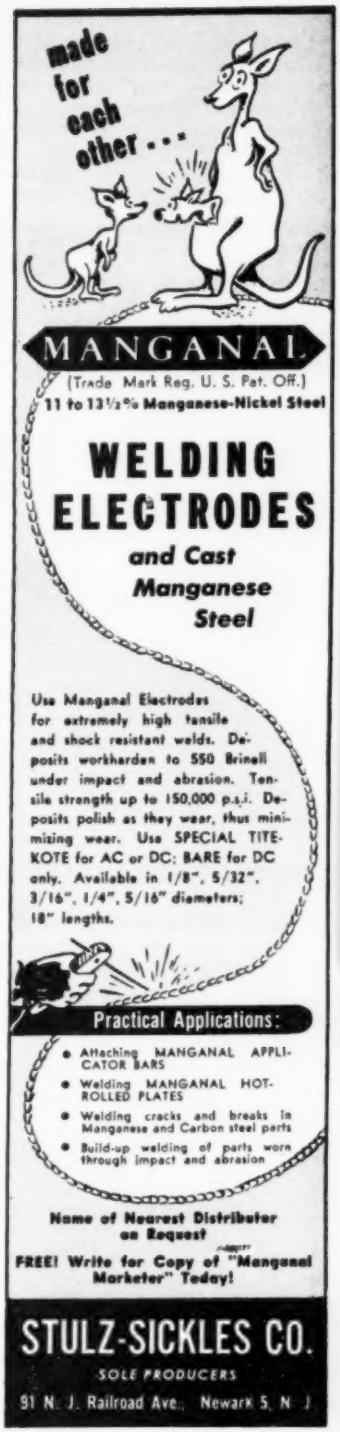
Charging the horizontal 72-hole rounds was time consuming. The answer has been a wooden, 5x10-ft. platform mounted on a Wagnermobile fork-lift truck. The diesel-powered vehicle has a power hoist for raising and lowering the platform from which the miners charge the holes. The unit reduced loading time by ⅓—two miners can charge and blast a round in five hours, all rounds loaded with three shifts of the platform. All the holes in a series are wired at once. The platform carries enough explosive for each setting.

Eliminate Tamping

Labor required to charge holes was also reduced by eliminating tamping except for the last cartridge. At present, 1¾x12-in. cartridges are used in 1⅞- and 2-in. holes. About 1,500 tons of rock are broken each round.

The cost of laying and moving air and water lines on the advancing levels of an underground quarry and the subsequent loss of air pressure as the lines became longer has been solved by the design of a movable compressor assembly. The unit has two 750-cfm compressors, an air receiver and water tank. Air and water lines will not be required with the equipment, with resultant savings in operating cost. The

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compressor motors will take the same voltage as the shovel, and the unit will use the same outlets—a compressor and a shovel will never work in the same heading at the same time.

Power is transmitted to the mine at 2,300, 440 and 110 volts, the 2,300 v circuit used by the shovel. Mobile equipment is furnished with floodlights. Power lines are buried in trenches from the main substation into the working area. There they are carried along the roof stone with drops to plug-in stations at convenient locations on each pillar.

A crushing plant and two 40-ton oil shale retorts of the NTU type were put into operation in 1947. Internally fired, these retorts process the shale in batches. Their combined 50-barrel-a-day capacity was not meant to fulfill the shale oil industry's hopes for inexpensive retorting but the plant handled the highly coking Green River shale very well—it also served to obtain data and to develop techniques. The new 200-barrel-a-day refinery went "on stream" last July. A commercial plant would probably have to be able to produce 10,000 barrels of shale oil daily to be economically feasible.

Plant Produces 6,000 Barrels

The demonstration plant had produced more than 6,000 barrels of crude shale oil by the end of last year. A third of this production has been used at the plant as boiler fuel while the rest has found its way to various oil company laboratories for refining research. Shale oil is a good raw material for producing motor gasoline, diesel and heating oil.

The first demonstration mine test run was made on the upper level in August and September last year. The tons per manshift were 81 for underground workers, 56 for the total force employed. At a cost of 49.7 cents a ton, 16,800 tons of rock were taken out of the Ledge. The latest record figures, taken less than a year later, show a reduction of 16.8 cents per ton and an increase in manshift output of 30 tons for underground labor and of 36.7 tons for all labor. Certainly the road to inexpensive production of shale oil which will help replenish the world's diminishing petroleum supplies has been opened up at Rifle, Colo.

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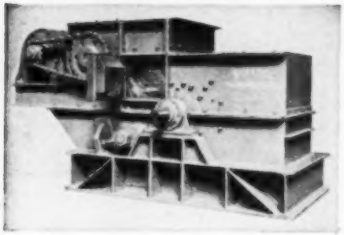

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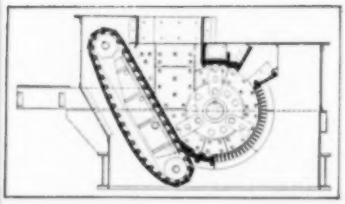

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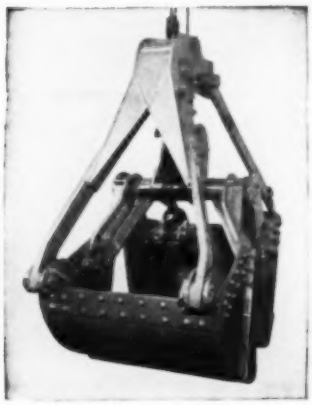
ERIE BUCKET CATALOG *Shows*



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Notes from the manufacturers

Euclid Road Machinery Co., Cleveland, Ohio, has named Paul A. McDonald to succeed J. W. Bloomquist as district manager covering North and South Dakota, Minnesota, upper Michigan, and parts of Iowa and Wisconsin. The company branch office in Hibbing which serves the Iron Range remains in charge of J. R. Blackburn. Bloomquist was recently made assistant sales manager.

Gar Wood Industries, Inc., Wayne, Mich., has announced the appointment of W. S. Blakeslee, Jr., as assistant general sales manager. Prior to his appointment Blakeslee was sales manager of the Wayne Division where he is being succeeded by R. J. Nymberg. Blakeslee has been with Gar Wood since 1935 except during the years of his Army service.

Hyster Co., Portland, Ore., has announced several personnel changes. John Mitchell, formerly retail salesman in the Chicago store, has been promoted to the position of district manager of truck sales for the northeastern section of the country. New lift truck sales district manager is John Cusick who will be responsible for the central portion of the United States. Also named to positions as district managers are W. J. O'Brien in the Southwest, C. E. Houston in the Northwest and Fred Schultz in the Southeast.

Mack Trucks, Inc., New York, N.Y., has named W. J. Fredrick manager of the company's Newark, N. J., branch with headquarters at 1239 Broad St., and G. F. Zeller manager of the New Brunswick N. J., branch with offices at 438 Raritan Ave. Fredrick joined the company as branch cashier in 1925 and rose to salesman and New Brunswick district manager, which latter position he assumed in 1940. Zeller became associated with Mack in 1917 as clerk and later spent many years as salesman. Last January he was made sales manager of the Newark branch. Mack has also appointed Charles F. Dedon manager of the company's Mineola direct factory branch. Dedon joined the company in 1918 as a clerk and since then has served as purchasing representative salesman, sales engineer and assistant manager of the New York branch.

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1. U. S. ARMY "GENERAL PATTON" TANK

Extended, heavy steel side plates protect sheaves
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Operators say it. Contractors show it. Records prove it. Omaha Buckets make every load a payload, every job a profitable one. The know-how of many contractors and engineers has been built into Omaha Buckets — surplus weight eliminated to give a greater total load; more sturdy design and construction for the tough digging jobs. For performance and profit on the job, Omaha Dragline Buckets Tops 'Em All!

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Digs easier — dumps cleaner. Fills with a shorter pull — load slides out through the wide arch.

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NOT in the *Contract*

A woman who was living in a hotel at San Francisco employed a Chinese boy. She said, "What's your name?"

"Fu Yu Tsin Mei," he replied.

"Your name is too long; I'll call you John."

The Chinese boy looked surprised.

"What's your name?" he asked.

"Mrs. Elmer Edward MacDonald."

"Your name is too long; I'll call you Charlie."

The owner of Bosco, the trained flea, was exhibiting him for the benefit of his dinner companions.

"Bosco," he said, "jump to the right." Bosco did as ordered.

"Bosco, hop into Mrs. Highrump's hair." Bosco obeyed.

Whereupon Bosco's owner reached up and set him back on the table.

"Bosco, jump over my wine glass." But Bosco wouldn't budge.

"Bosco, forward, march," But the flea remained still.

"Heavens," said the owner, after looking at the unwilling performer, "this—isn't Bosco!"

The honeymoon is over when the wife starts complaining about the noise her husband makes getting breakfast.

The road construction crew had worked for weeks in the midst of the desert. The blazing sun burned into everything in sight and it was miles to the nearest water. The youthful timekeeper sat sadly on a stone, his head in his hands.

"What's the matter with him?" asked the super.

"Homesickness," replied the grade foreman.

"We've all got that."

"Yes, but his is worse than ours. His father owns a saloon!"

A shovelrunner from Texas, newly arrived in England, was playing poker with a couple of natives. He was pleasantly surprised upon picking up an early hand to see four aces in it.

"I'll wager a pound," said the Britisher on his right.

"Ah don't know how y'all measure your money," drawled the Texan, "but Ah reckon Ah'll have to raise yuh about a ton!"

"No need to hook it up. Ed went on an awful bender last night!"

The super called the project's foremen to his office. "I understand," he said, "that all of you have been dating Miss Jones, our typist. I want the truth now—which of you have been taking her out?"

Seven of the foremen slowly and sheepishly raised their hands. The big boss glared at the eighth, "Are you SURE you are telling the truth?"

"Yes, I am," was the reply.

"All right, then," shot back the super. "You fire her!"

"Can you help me select a gift for a wealthy old aunt who is awfully weak and can hardly walk?"

Clerk: "How about some floor wax?"

A minister, while visiting one of his flock who had been a sailor, heard the parishioner's parrot make a few remarks in the way only a true sailor's parrot can. The man was very much embarrassed and apologized. The minister didn't seem alarmed, but said he had a parrot that prayed all the time. After a while the good Reverend made the suggestion that he thought his parrot would have a good influence on the sailor's bird. The sailor agreed, so the next day the minister brought his parrot to spend a few days with the other bird.

When the sailor's parrot saw the addition to his cage he immediately remarked, "How about a little loving, babe?"

Answer: "What the hell do you think I've been praying for all these years?"

The artist kissed his model. "I bet you do that to all your models," she said.

"No," he replied. "You are the first."

"How many models have you had?"

"Four," he answered. "A rose, an onion, a banana and you."

A much-sought-after speaker arriving at a nudist camp was greeted by the residents of both sexes—all garbed in their accustomed manner. The camp director said "Dinner is at eight o'clock. I expect you would like to go to your room and get ready."

"Thank you," said the speaker. Alone in his room, he walked about nervously trying to make up his mind. When the dinner bell sounded, he was still undecided, but suddenly took off his clothes and descended to the dining room.

As he entered, the entire group awaited him, dressed in evening clothes in his honor.

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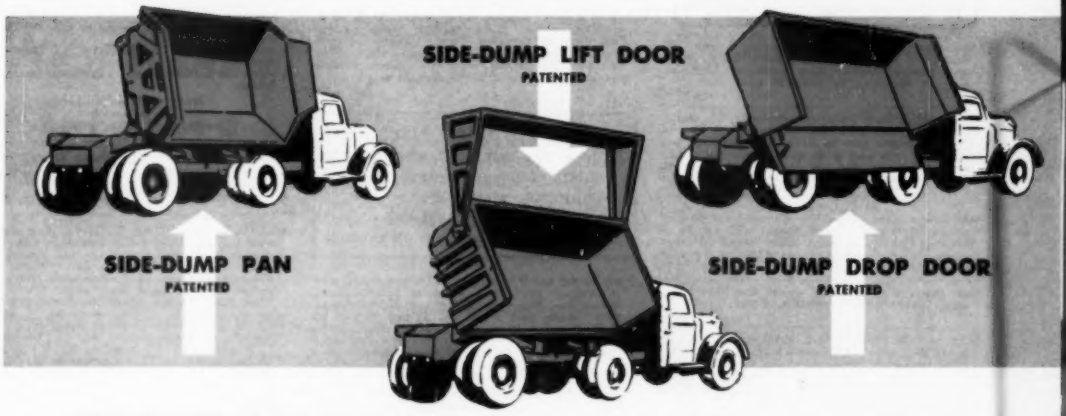

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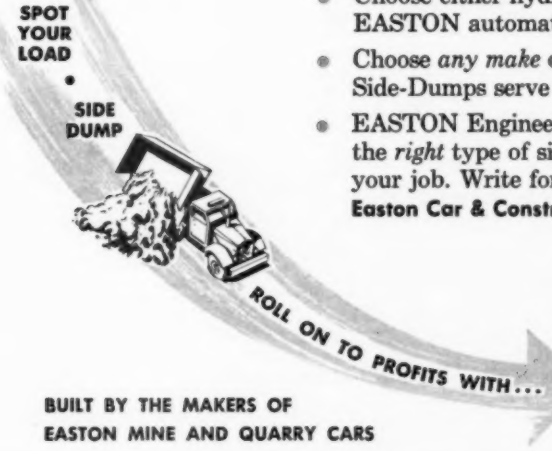

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TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

Used Bucyrus-Erie 750-B stripping shovel, 98' boom, 64' handle, 17 yd. dipper. Good condition. Central location, now operating. Available account changing to dragline operation.
Box 3359

Bucyrus-Erie 54-B dragline excavator, 80' boom, 10,000 lbs. extra counterweight. Buda Lanova diesel. Bought new in June 1942. Machine has standard cats and is in good operating condition. Price includes 2½ yard dragline bucket. Price $25,000 f.o.b. Benton, Kentucky.

Easley Contracting Company
Benton, Kentucky

Marion 490 2½-yd. electric shovel with 600 ft. of trailing cable and about $4000 worth of spare parts. Electrical equipment 3/60/440; rebuilt this year. Eastern location.
Box 3370

New Bucyrus-Erie 200-W diesel dragline, never used, immediately available, central location.
Box 3350

Bucyrus-Erie 85-B 2¼-yd. electric shovel, good condition, can be demonstrated, central location, attractive price.
Box 3364

Marion 93M 2½ yd. diesel shovel. Two years old. Located in Ohio.
Box 3363

Lima 802 powered by model D-17000 Caterpillar diesel engine. Standard shovel attachment with 2-yard Esco dipper, also 2-yard Pettibone-Mulliken dipper. Machine equipped with light plant, water heater. Was two years old last May and recently overhauled at cost of $10,000. This shovel in excellent running condition and can be demonstrated and inspected at any time. Price $27,500 on cars.
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1—¾ yd. Byers equipped with new 4 cylinder International model UD9 gas engine, combination trench hoe, shovel, crane. Excellent operating condition.

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Model 44-B BUCYRUS-ERIE 2 yd. shovel with BUDA diesel engine. Equipped with 15'-2" tracks, 33" pads. (Machine now located in Ohio)

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Bucyrus-Erie standard 15-B dragshovel (serial No. 23325) equipped with a Buda HP-326 gasoline engine installed in 1947. Machine is in excellent condition.

Stuart M. Christhilf & Co., Inc.
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SACRIFICE

New 1½-yard Bucyrus-Erie model 38-B combination shovel and dragline diesel power. Delivered in October, 1948. Unused because work anticipated did not materialize. Will sacrifice for 10 per cent off manufacturer's current list price. Mid-Western location.
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Excavating Engineer
South Milwaukee Wisconsin

P&H model 655-B, shop No. 11732 purchased new in August 1947 at a price of $37,500 f.o.b. Milwaukee, Wisconsin. Equipped with 24' boom, 17'0" sticks and 2 cu. yd. dipper, driven by G.M. Diesel 6-71 engine. Located near Hazleton, Pa.
Box 3353

A Real Bargain

½-cu. yd. Bucyrus-Erie model 15-B gasoline-powered combination shovel, dragline, and clamshell excavator. Excellent condition. Mid-western location.
Box 3361

Used 1½-yard Bucyrus-Erie model 41-B electric shovel wired for 3 phase 60 cycle 440 volt current. Good condition. Mid-western location.
Box 3367

Bucyrus-Erie model 42-B Shop No. 11554, single motor electric shovel, 1-½ cu. yd. rock dipper, for operation on a power supply of 3 phase, 60 cycle, 2300 volts; new 1933. No reasonable offer will be refused. Located near Wilkes-Barre, Pa.
Box 3354

International model TD-18 TracTracTor equipped with Hughes-Keenan model MC-8 Roustabout crane. Tractor powered with 6 cylinder diesel engine with gas starting motor, 18" flat overlapping track shoes, muffler, lights, radiator guards, front bumper, heavy front idlers, crankcase guard and front tow hook. Crane has gooseneck type 21' to 27' telescoping boom. This equipment delivered late in 1946 and has had less than 100 hours use.
Box 3375

Two Bucyrus-Erie model 27-T blast hole drills, gasoline powered, completely overhauled, including 6" tools. Located northern Minnesota.
Box 3345

Brand new Esco scoop lip dipper for Manitowoc shovel, complete with short bail. Immediate delivery. Price f.o.b. St. Paul, Minn. $3068.

J. L. Shiely Company St. Paul 4, Minn.

Omaha scraper bucket (3½-yd.) type LCR. Complete with drag and hoist chain. Excellent condition. Slight service. Address all inquiries to:

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514 South 7th Street Osage City, Kansas

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Box 3372

New Dragline Buckets

2—1¼ cubic yard Red Arch Type AX medium duty buckets.
2½ cubic yard Type AX dragline bucket. (Reconditioned.)
3 cubic yard Red Arch, Type AY heavy duty bucket.
5 cubic yard Red Arch, Type AY heavy duty bucket.
6 cubic yard Red Arch, Type AY heavy duty bucket.

Bucyrus-Erie Company
Parts Division
South Milwaukee, Wisconsin

Latest model Tournadozer-Super C's FP and W scrapers, rooters, tampers. Bucyrus-Erie crane E-2, Hydrocranes.

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Bucyrus-Erie No. 8 bit dresser. Complete and in perfect operating condition. Located in Washington State.
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New Diesel Engine

1—Buda Lanova 4-DT-226 diesel engine 4 cylinder 3¾" x 5½" with accessories.

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1—120-B Bucyrus-Erie steam shovel, 5-cubic yard dipper. Also spare parts.
2—50-B Bucyrus-Erie steam shovels, 1¾-cubic yard dippers.
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1—Model N-72 Ingersoll-Rand Jackhamer.
1—Model X-59 Ingersoll-Rand Jackhamer.
2—No. 6 Champion jaw crushers.
Box 3349

Placer Gold Dredge

8 cu. ft. diesel-electric, Bucyrus-Erie bucketline dredge and necessary auxiliary equipment for a one dredge operation will be sacrificed at fraction of replacement cost. Dredge is in good mechanical condition; was built new in 1940. Digging depth, 30 ft. below water.

Equipped with two Ingersoll-Rand type S diesel engines, Byron-Jackson pumps, electrical equipment all General Electric. Sectionalized steel pontoon hull. Complete specifications and price on request. Dredge can be inspected in running condition at Sunbeam, Idaho. Address inquiries to Box 3337 care of Excavating Engineer.

Dragline attachment for Bucyrus-Erie 54-B. Includes 80' boom, fairleads, drum laggings, high A-frame and 2½ yd. Daniels-Murtagh bucket. Located Pennsylvania. Price complete F.O.B. $4500.
Box 3352

Continued on page 53

For Sale

Continued from page 52

5-cubic yard heavy duty dipper with welded alloy steel body, cast lip with two-piece Vanderhoef teeth, new condition. c/o Excavating Engineer, Box 3365.

Wanted: Used shovel front-end equipment for Bucyrus-Erie model 44-B machine. Box 3362.

Wanted: Complete chain crowd shovel front end equipment for Bucyrus-Erie 32-B dragline. Box 3319

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EXPORT SALES REPRESENTATIVES for both inside and outside positions. Preference will be given to qualified salesmen having technical or practical engineering training. Applicant should be under 36 years of age. Knowledge of heavy construction and mining machinery preferred. Write full particulars in first letter and enclose recent photo. Our sales organization knows about this ad. Box 3371

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Excavating Engineer
South Milwaukee — Wisconsin

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Construction superintendent available, twenty years experience all types of projects. Good health and do not drink. References from established reliable firms. Box 3358

Gen. supt. or supt. available. Experience covers 25 year supervising, estimating and building, all classes of excavating; railroads; highways; airports; earth-fill dams; large sewers. Honest sober, reliable. Best of references. Salary open. Box 3336

Looking for a job as shovel-crane, dragline or clamshell operator. Can operate large or small machines. Any make. Diesel, gas, steam or electric. Experienced on all kinds of grading and excavating. Prefer coal or iron ore stripping. Can give good references. Box 3360.

New trade literature

Title: **Jackhammer Pamphlet**

Subject: Paving breakers are the subject of a new bulletin. Various models are pictured along with their specifications and applications. A sheeting driver attachment for two of the models is also described.

Where to Get: Worthington Pump and Machinery Corp., Harrison, N. J. Ask for Bulletin H-1200-B40. (Free)

Title: **Arc Welding Accessory Catalog**

Subject: A new 20-page catalog contains descriptions, specifications, and prices of more than 150 arc-welding accessories. Included is information on electrode holders, helmets and goggles, tungsten electrodes, all types of protective aids and clothing, cable connectors, ground clamps, cleaning tools, and brushes.

Where To Get: General Electric Co., Schenectady 5, N. Y. Ask for publication GEC-253A. (Free)

Title: **Pipe Bulletin**

Subject: Specifications for a wide variety of Spiral-Weld pipe are listed in a new bulletin. It shows sizes and wall thicknesses now available and the various applications of the pipe. Forge fittings and flanges intended for use with the pipe are also included.

Where to Get: Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90, Ill. Ask for Bulletin 493. (Free)

Title: **Earthmover Booklet**

Subject: An illustrated 16-page booklet presents different types of heavy-duty equipment in the Caterpillar line working on the various jobs involved in an earthmoving project—pioneering, clearing, short haul work, cut and fill operations, grading and finishing of surfaces.

Where To Get: Caterpillar Tractor Co., Peoria 8, Ill., or any Caterpillar dealer. Ask for Form 12311. (Free)

Title: **Transmission Belt Catalog**

Subject: A 28-page catalog gives detailed design, engineering and performance data of transmission belting. Tables on belt speeds, arc of contact, friction, hp correction and service factors are included along with hints on proper selection of a belt and the procedure for analyzing belt drives.

Where To Get: United States Rubber Co., Rockefeller Center, New York 20, N. Y.

Title: **Diesel Bulletin**

Subject: A 4-page folder describes a line of diesel and gasoline engine-driven generator sets, ranging in capacity from 5 to 250 kw. Applications, special features and the availability of spare parts and service are discussed.

Where to Get: International Diesel Electric Co., 13-02 44th Ave., Long Island City 1, N. Y. Ask for Bulletin 112. (Free)

Title: **AGC Construction Safety Manual**

Subject: The third edition of the AGC "Manual of Accident Prevention in Construction" is now available. Its 264 pages and approximately 100 illustrations give correct ways of performing construction work, emphasizing the costly results of unsafe practices. The booklet estimates that accidents cost the construction industry $787½ million in 1948.

Continued on page 56

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Whenever you need help in job planning and operation, want service, or information on application of construction equipment, call your LeTourneau Distributor. We're proud of his record as a partner in our business . . . proud of the job he is doing. You'll find him quick to respond . . . conscientious, impartial . . . always ready to serve you to your best interest . . . a good friend to know.

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To attain closest cooperation among customer, distributor and factory, your LeTourneau Distributor and company field engineers are always available to help study project requirements . . . analyze costs . . . and suggest, impartially, the most efficient methods of getting the work done.

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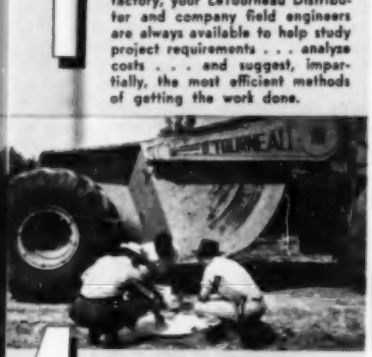
Upon arrival of equipment at the job, your LeTourneau Distributor, or factory service experts, thoroughly check, inspect and test every LeTourneau machine to make sure that it is delivered to you in A-1 condition . . . ready to fulfill every promise of lowest-net-cost-per-yard operation.

3 Operator Instruction

To assure you maximum production efficiency from your men and machines, factory-trained Distributor men give your operators practical, first-hand instruction on correct care and operation of equipment . . . and help set up proper lubrication, service, and preventive maintenance schedules.



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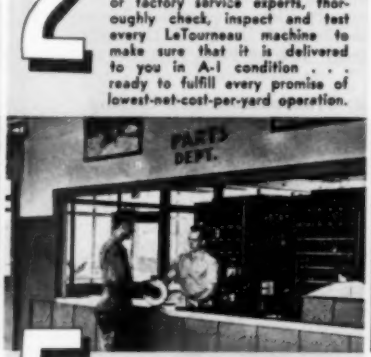
Cooperation extends out into the field, onto the job, where Distributor and LeTourneau engineers help plan haul routes, cut and fill areas, and assist in establishing overall job operations for the most efficient application of this high-speed, rubber-tired excavating, hauling and dozing equipment.



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BUCKETS

New Trade Literature

Continued from page 53

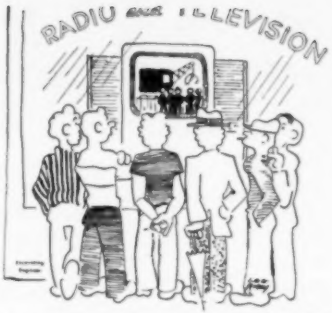
Among new sections, not included in previous editions are electric welding, explosive gases and liquids, motor graders, bulldozers and tractors.
Where to Get: Associated General Contractors of America, Inc., Munsey Bldg., Washington 4, D. C. (Price $3 postpaid)

Title: **Safety Booklet**
Subject: How a cement mill cut down its accident rate is told in story form in a pamphlet "For Pete's Sake." It tells briefly what safety measures were put into effect.
Where to Get: Portland Cement Association, 33 W. Grand Ave., Chicago 10, Ill. (Free)

Title: **Drill Catalog**
Subject: A new 12-page catalog is devoted to three sizes of wagon drills—light, medium and heavy weights. Line drawings emphasize cost reductions affected by using these drills.
Where to Get: Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. (Free)

Title: **Magnet Applications**
Subject: Illustrations, drawings and detailed explanations on the use of permanent magnets and metal detectors in coal, metallic and nonmetallic mines are part of a new 4-page, 2-color bulletin.
Where to Get: Eriez Mfg. Co., 1230 E. 12th St., Erie, Pa. (Free)

Title: **Snow Removal**
Subject: "Bucking Snow Costs" is the title of an 8-page illustrated bulletin which gives data on ways to remove snow at low cost. Photographs show on-the-job performance of diesel-powered equipment.
Where to Get: Caterpillar Tractor Co., Peoria 8, Ill., or Caterpillar dealers. Ask for 12479. (Free)



Title: **Hardfacing Guidebook**
Subject: A revised edition of this guide covers applications of hardfacing alloys in heavy industry. The booklet gives detailed information on choice and application of various hardfacing metals used in heavy construction, mining, cement plants, dredging, rock products plants and similar operations. About 100 uses for the hard metals are described.
Where To Get: Stoody Co., Whittier, Calif. (Free)

Clay Roundup

Continued from page 19

movers into shape for the next day. In addition to the day shift, two Cat D8's equipped with Caterpillar scrapers carry on during the single night shift. The early morning shop crew conditions these units for the 7 am shift.

Under contract the clay is shipped as mine run to the Filtrol Corp. plant in Los Angeles, with peak weeks sending out as much as 55 to 60 railcars. After crushing and processing, the McCarrell and Gurley bentonite makes its way to refineries and other industries—most of which have upped their demand for it within recent years.

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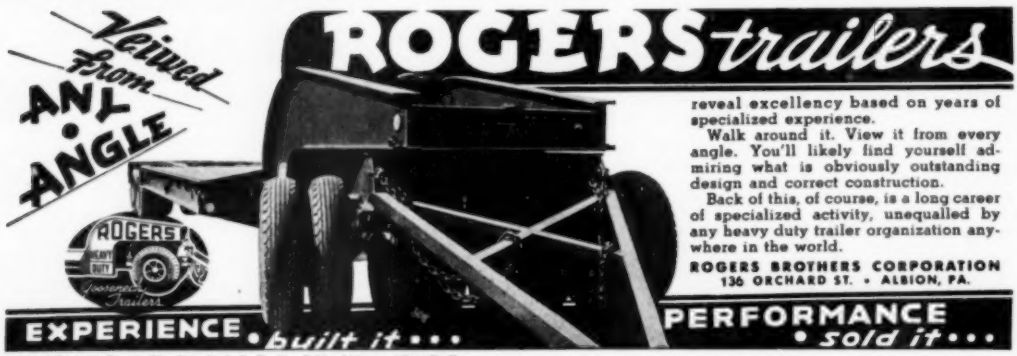

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***When you specify** LAY-SET Preformed for any machine in industrial, mining, or contracting service, you get the best construction and best grade of wire rope for the job. Ask your Hazard distributor for LAY-SET Preformed Wire Rope—and for ACCO Registered Wire Rope Slings*

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